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**Diet and nutrition among people receiving opioid substitution treatment
A mixed methods study**

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**DIET AND NUTRITION AMONG PEOPLE
RECEIVING OPIOID SUBSTITUTION
TREATMENT: A MIXED METHODS STUDY**

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A THESIS SUBMITTED FOR THE DEGREE OF

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Abstract

Aim: This study's aim was to improve our understanding of the dietary behaviours of people receiving opioid substitution treatment (OST) in the UK.

Setting: The study focuses on people receiving prescribing interventions for OST from pharmacies in Oxfordshire, England.

Methods: Dietary behaviours were assessed using a longitudinal convergent parallel mixed methods research design. Quantitative methods included a socio-demographic and drug use questionnaire, SF-36 health related quality of life questionnaire, 24-hour dietary recall interview, and anthropometry measures. Qualitative semi-structured face-to-face interviews were conducted to understand how individuals' experiences with food and diet influence their dietary behaviours. Follow-ups were conducted four months after baseline data collection. The same quantitative and qualitative research tools were applied at the second stage of the study.

Results: Mean (SD) Body Mass Index for males (n=15) and females (n=10) exceeded the normal range [25.2 (5.9) kg/m² and 33.3 (8.6) kg/m², respectively] at baseline. Males decreased to the normal range at follow-up [mean (SD) = 24.1 (± 6.2) kg/m²]. Females increased to Obesity Class II at follow-up [mean (SD) = 35.1 (± 8.0) kg/m²]. Non-starch polysaccharide intakes were significantly lower than the Reference Nutrient Intake (RNI). Iron intakes among females were significantly below the RNI. Saturated fat intake and sodium intake exceeded the RNI. Eleven (44%) participants had multiple health conditions. Food consumption was influenced by factors such as childhood eating, mental health issues, digestive issues, limited financial resources, drug use and accommodation.

Conclusions: People receiving OST in the UK may be at risk of development of non-communicable diseases (NCDs). Dietary and nutritional recommendations may benefit this population. Recommendations must accommodate for specialised needs. Further research is required in the UK to understand aspects such as multi-morbidity rates, rates of overweight and obesity, food acquisition, food preparation skills and food expenditures.

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Abbreviations

Abbreviation	Meaning
24HR	24-hour dietary recall interview
AI	Actual intake
ASE	Attitude-social influence efficacy
BD	Body density
BF%	Body fat percentage
BM	Body mass
BMI	Body Mass Index
CHO	Carbohydrate intake
CVD	Cardiovascular disease
CI	Confidence Interval
CNS	Central nervous system
CRB	Criminal Records Bureau
CSE	Certificate of Secondary Education
CT	Channel Theory
CVD	Cardiovascular disease
DAAT	Drug and Alcohol Action Team
DIFF	Difference
DRV	Dietary Reference Value
EAR	Estimated Average Requirement
EST	Ecological Systems Theory
EU	European Union
FFQ	Food frequency questionnaire
FM	Fat mass
GCSE	General Certificate of Secondary Education
GM	Gatekeeping Model
GP	General practitioner
HBM	Health belief model
HC	Hip circumference
HIV	Human immunodeficiency virus
HRQOL	Health related quality of life
LBM	Lean body mass
LES	Drug misuse local enhanced service
LIDNS	Low Income Diet and Nutrition Survey
LRNI	Lower Recommended Nutritional Intake
MAP	Maudsley Addiction Profile
MUFA	Mono-unsaturated fatty acids
NCD	Non-communicable disease
NDNS	National Diet and Nutrition Survey
NICE	National Institute for Health and Clinical Excellence
NMES	Non-milk extrinsic sugars
NMES	Non-milk extrinsic sugars
NSP	Non-starch polysaccharide
NTA	National Treatment Agency for Substance Misuse
NVQ	National Vocational Qualification
OIBD	Opioid-induced bowel dysfunction
OST	Opioid substitution treatment

Abbreviation	Meaning
PBM	Planned behaviour model
PUFA	Poly-unsaturated fatty acids
RNI	Reference Nutrient Intake
SACN	Scientific Advisory Committee on Nutrition
SAD	Seasonal Affective Disorder
SAT	Saturated fatty acids
SCT	Social cognitive theory
SD	Standard deviation
SEM	Social-Ecological Model
SES	Socio-economic status
SF-36	SF-36 Health related quality of life questionnaire
SPSS	Statistical Package for Social Sciences
TEM	Technical error of measurement
TRA	Theory of reasoned action
TTM	Transtheoretical model
UK	United Kingdom
UN	United Nations
US	United States
WC	Waist circumference
WHO	World Health Organisation
WHR	Waist-to-hip ratio

Preface

This research sets out to explore the dietary behaviours of people receiving opioid substitution treatment (OST) in the United Kingdom. This is achieved by applying a mixed methods design to explore dietary intake, nutrient intake, body composition and the lived experience of food and eating through the life course. A theoretical framework called Ecological Systems Theory (EST) is applied to analyse the individual and environmental factors that may influence dietary behaviours.

Chapter One introduces the background to the research and indicates the gaps in current knowledge about people receiving OST and their dietary behaviour.

Chapter Two reviews previous dietary research studies of people receiving OST to determine the major findings from international and national studies.

Chapter Three reviews theoretical food models to ascertain a model that can be effectively applied to the current study.

Chapter Four describes the methodology used in the current study and how data for dietary behaviour were obtained.

Chapter Five describes the socio-demographic backgrounds, drug use histories and health related quality of life of people receiving OST.

Chapter Six describes body composition measures, dietary intakes and nutrient intakes of people receiving OST.

Chapter Seven describes food consumption, food acquisition and body weight from childhood up to the time of interview.

Chapter Eight describes food consumption, food acquisition, food preparation, physical health, and weight while receiving OST at two time points (baseline and four month follow-up stages).

Chapter Nine applies the EST model to the major findings and discusses them in a broader context to understand the environmental factors and social phenomena that influence dietary behaviour of people receiving OST. Policy, practice and research implications are recommended. The research study's objectives and the strengths and limitations are discussed.

Chapter Ten presents the conclusions of the research. The original contribution to knowledge of the study and future recommendations for work are discussed.

Chapter 1 Introduction

Drug misuse is a serious health care problem. As of 2010, there were an estimated 13 to 21 million individuals who used illicit opioids, particularly heroin, worldwide. Since the 1990s, the number of people who use opioids decreased by 15%; however, there were an estimated 3.8 million to 4.3 million people who use opioids in Europe (United Nations Office on Drugs and Crime, 2012). The United Kingdom (UK) had one of the highest recorded rates of substance misuse in Europe and also the highest rate of people who use drugs enrolled in community based treatment (European Monitoring Centre for Drugs and Drug Addiction, 2010a, European Monitoring Centre for Drugs and Drug Addiction, 2010b). In England alone, there were 193,098 people who use drugs in treatment, of which 79% were treated for opioid use in 2013-2014 (National Drug Treatment Monitoring System, 2014).

Services for people who use opioids were primarily initiated in the 1990s to reduce drug-related harms, contraction of blood-borne viruses, drug-related health problems and crime (Anglin and Hser, 1990). Prescribing medications such as methadone or buprenorphine for opioid substitution treatment (OST) was one of the most widely utilised methods to reduce withdrawal symptoms experienced from opioids and improve quality of life (Ponizovsky and Grinshpoon, 2007, Giacomuzzi et al., 2006, Giacomuzzi et al., 2005, Giacomuzzi et al., 2003, Barnett et al., 2001, Pani et al., 2000). Harm reduction services also provided needle exchange to reduce the risk of contracting blood borne viruses such as human immunodeficiency virus (HIV) and Hepatitis C. Free prescribing of OST for maintenance therapy was also used as a part of harm reduction.

The current drug strategy is focused on treating people who use drugs in order to reach recovery and abstinence from substance misuse (HM Government, 2010a). For people receiving OST, an individual-centred approach to gauge an individual's likelihood of becoming free of their drug dependence utilises the concept of recovery capital (Cloud and Granfield, 2004, Cloud and Granfield, 2008). For effective treatment, health and social care services are essential for a vulnerable population group that is susceptible to poor physical, psychological and social health (Aday, 2001). Dietary guidance or support may be one of the care factors to consider further to complement the accrual of recovery capital by improving health and well-being during OST.

There are no policies related directly to diet or nutrition among people who use drugs, people who inject drugs or people receiving opioid substitution treatment (OST) in the UK. However, there are governmental policies that target drug recovery in people who use drugs and dietary policies for the general population. These policies can be investigated for their application to social care and wellness needs to pinpoint areas that are understudied or need further consideration.

1.1 Harm minimisation to recovery from substance misuse

From the mid-1980s, drugs agencies that were funded under the Central Funding Initiative began work with drug users to treat associated drug problems, which became a discourse known as 'harm minimisation' (Stimson and Lart, 2005). The drug strategies, *AIDS and Drugs Misuse Pt. 1*, and the following report, *AIDS and Drug Misuse Pt. 2*, addressed harm reduction from injecting drug use in the late 1980s (Department of Health, 1989, Department of Health and Social Security, 1988). The policies focused on addressing the threat of AIDS and preventative measures to protect people who inject drugs from contracting and transmitting the virus. Action toward harm reduction initiated lobbying for drug policies that assessed drug problems to reduce associated harms that affected individuals, communities and societies at large. Needle and syringe exchange schemes reduced risk of exposure to blood-borne viruses such as Hepatitis B and C and HIV/AIDS; health education, free condoms and flexible methadone prescribing became readily available (Robertson, 1987).

OST was one form of available drug treatment in the effort to reduce drug injection and associated harms. Maintenance therapy in the form of an oral treatment such as methadone or buprenorphine, reduced craving and prevented withdrawal, freeing an individual from preoccupation with obtaining illicit opioids. The options for the individual were to choose maintenance therapy as an ongoing replacement for illicit opioids or detoxification with the inclusion of dose reduction to stop opioid use (Ford et al., 2011). The length of treatment varied for each individual: some individuals could achieve rapid results to abstinence while others required prescribed medication for a longer term period.

In 1995, a Drug Strategy entitled, *Tackling Drugs Together*, focused on prevention and public health by minimising harm to communities and the public at large (Department of Health, 1995). Less emphasis was placed on the welfare of the individual who was using drugs; there was a move toward the discourse on anti-drugs strategies, with greater involvement from the criminal justice system to tackle drugs misuse (Duke, 2006). In 1996, the Labour Party concentrated their efforts in tackling drug-related crime by expanding drug treatment in a variety of ways - from prevention measures among youth, to ordering offenders to attend drug treatment using the Drug Treatment and Testing Order from the Crime and Disorder Act 1998 in the 10-year strategy, *Tackling drugs to build a better Britain* (Hucklesby and Wincup, 2010, HM Government, 1998, Straw, 1996).

In 2002 and 2004, *Updated drug strategy* and *Tackling drugs: changing lives*, both emphasised drug treatment interventions in the criminal justice system by ordering offenders who were using drugs to treatment (Drugs Strategy Directorate, 2004, Drugs Strategy Directorate, 2002). In 2008, *Drugs: protecting families and communities*, focused on the effects of drug-related problems in societies, communities and families by combining a strategy that involved the protection of families and communities through prevention measures and communication, but also included the enforcement of prison treatment interventions for offenders who use drugs and drug treatment for individuals who use drugs.

In 2010, a new strategy entitled *Drug strategy 2010, Reducing demand, restricting supply, building recovery: supporting people to lead a drug free life*, was issued that centred on the concept of a recovery system that would shift the focus from drug-related crime to treatment and a recovery system through local services (HM Government, 2010a). Recovery in this context incorporated the term 'recovery capital': predictors used to gauge an individual's likelihood of becoming free of their drug dependence. Recovery capital was broken down into further areas of capital: social capital, physical capital, human capital and cultural capital (Cloud and Granfield, 2008). Social capital included the resources available to individuals through their relationships with their families and groups. Physical capital was measured by tangible assets available to individuals. Human capital was regarded as any personal resources in order for an individual to prosper. Cultural capital incorporated the values and beliefs and the ability to adapt to dominant social behaviours.

The National Treatment Agency (NTA), produced the report, *Recovery-orientated Drug Treatment*, that discussed treatment strategies for practitioners and treatment providers to provide more effective treatment under the new drug strategy (National Treatment Agency for Substance Misuse, 2011). The report emphasised the building of a recovery care plan that was built around the patient and an individual-centred journey. Treatment was intended to attend to each patient's needs in a relevant and personalised form in order to increase the likelihood of commitment and motivation. In 2012, a report by the NTA also emphasised a focus on recovery by attending to an individual's needs as a whole person, not by an end state (National Treatment Agency for Substance Misuse, 2012b). Treatment and support services which included social care, education, training and employment would complement the activities of commissioners by working together. In the same year, the release of *Putting Full Recovery First*, described the achievement of full recovery by initiating payment by results to treatment providers and using a systems approach that involved education, training, employment, housing, family support services and wider health services (HM Government, 2012).

In response to the drug treatment review and the newly implemented recovery plan, an annual review of the drug strategy changes and their implementation was published in 2013 (HM Government, 2013a). Through comprehensive assessment of the drug strategy agenda, services were implemented to encourage accrual of recovery capital at the national, regional and local levels. Changes to services provided the opportunities for individuals to accrue recovery capital in the necessary areas such as: accommodation, employment opportunities, social network and support, medical attention and psychosocial interventions.

While the drug strategy, the drug treatment reports and the annual review included recommendations to provide services for accrual of social, physical, human and cultural recovery capital, the reported improvements to recovery in the updated agenda were primarily aimed at employment, accommodation, offender rehabilitation and public health with an emphasis on drug treatment (HM Government, 2013a). The co-design approach to pilot the payment by results to commission treatment services was initiated in eight local areas (Department of Health, 2013a). One of the results sought from the pilots was improved health and well-being. The actual outcome of the pilot testing in improved health and well-being was helping service users gain access to

and sustain suitable accommodation, cessation of injecting and Hepatitis B immunisation, without further focus on other wellbeing outcomes (Department of Health, 2014a). While public health was mentioned as a priority measure, other wellness goals that contribute to health and well-being such as diet and fitness were not addressed (Department of Health, 2014a, Drug Scope and UK Drug Policy Commission, 2011).

It is essential to understand the importance of health and well-being among the general population and, particularly, vulnerable populations by bringing the UK's obesity epidemic into perspective. The current rates and occurrence of non-communicable diseases (NCDs) will provide the background to the importance of health and well-being. The current dietary and nutrition policies will highlight how the UK have made an effort to address the epidemic. The end of the chapter will discuss the gaps in drug policies and food and nutrition policies for people receiving OST.

1.2 A global perspective of non-communicable diseases (NCDs)

NCDs are recognised as a growing epidemic among nations worldwide. NCDs such as cardiovascular diseases (CVD), diabetes, chronic respiratory disease and certain cancers, are a risk to both low and high-income countries and within country populations on global, national and local levels (Daar et al., 2007, Beaglehole and Yach, 2003). NCDs increase the global burden of illness by reducing quality of life and preventing economic growth. Prevention measures and interventions are more cost effective per capita than long-term treatment of NCDs (World Health Organization, 2011).

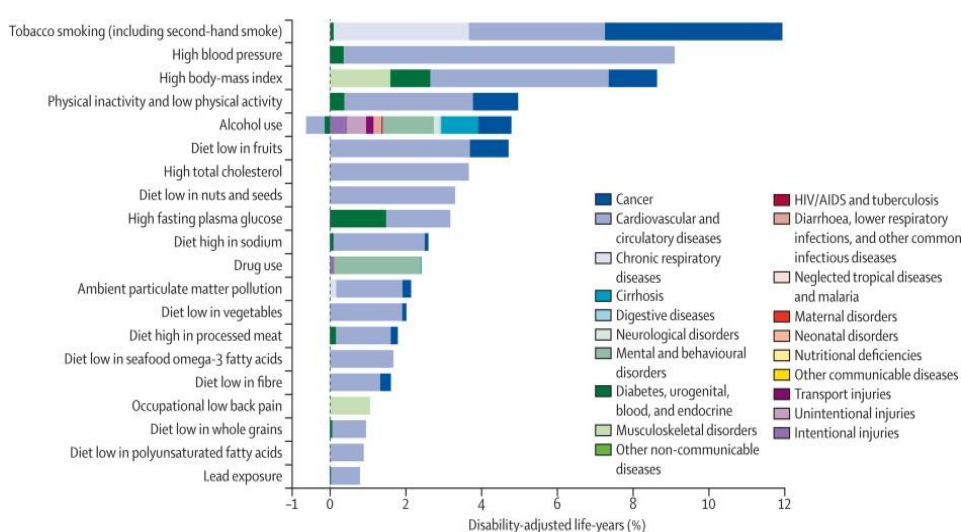
Through appropriate measures, NCDs are preventable. They are primarily linked to unhealthy dietary behaviours and lifestyle factors, particularly through their associations with metabolic and physiological causes. The main risk factors to NCDs were reported as: tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity (Alwan, 2011). The main risk factors to global mortality (percentage of all deaths globally) were: high blood pressure (13%), tobacco use (9%), high blood glucose (6%), physical inactivity (6%) and overweight and obesity (5%) (World Health Organisation, 2010).

1.3 Diet-related morbidity risks and obesity rates in the UK

Reduced quality of life and premature mortality in the UK were primarily linked to factors such as tobacco use, high blood pressure, overweight and obesity, physical inactivity and excessive alcohol consumption (Department of Health, 2014b). Since the early 2000s, the percentage of the general population who engaged in unhealthy lifestyle factors (e.g. smoking, excessive alcohol use, poor diet and low levels of physical activity) decreased. In 2003, 33% of the general population engaged in unhealthy behaviours, and in 2008, the percentage decreased to 25%; however the majority of changes occurred in higher socio-economic status (SES) groups (Buck and Frosini, 2012).

According to Figure 1, of the 20 leading risk factors attributable to the burden of disease in the UK, nine factors are directly related to dietary intake: low fruit intake, low nuts/seeds intake, high sodium intake, low vegetable intake, high processed meat intake, low omega-3 intake, low fibre intake, low whole grain intake and low polyunsaturated fatty acids intake. Two factors are diet-related conditions that increase risk of CVD: high blood pressure and high total cholesterol. High Body Mass Index (BMI) and low physical activity both increase the risk of metabolic and physiological disease conditions associated with overweight or obesity.

Figure 1 Burden of disease attributable to 20 leading risk factors for both sexes in 2010 in the UK



Source: (Murray et al., 2013)

Results from Health Survey for England (HSE), Scotland and Wales, as well as the National Diet and Nutrition Surveys (NDNS) in the early 1990s showed rising trends in obesity prevalence in the UK over time (Rennie and Jebb, 2005). The proportion of obese adults in the UK has steadily risen from the 1990s to the early 21st century. According to Table 1, as of 2012, over half of the UK adult population had a BMI above the normal range (18.5 – 24.9 kg/m²).

Table 1 Overweight and obesity prevalence in the UK adult population (1993-2012)

Obesity trends in the UK (1993-2012)	1993		2012	
	Males	Females	Males	Females
Normal BMI (18.5 – 24.9 kg/m ²)	41.0%	49.5%	32.1%	40.6%
Overweight and obese adults (25 – 29.9 kg/m ²)	57.6%	48.6%	66.6%	57.2%
Obese adults (> 30 kg/m ²)	13.2%	16.4%	24.4%	25.1%

Source: (Health and Social Care Information Centre, 2014)

Diseases associated with obesity can be costly to individual health and household. According to Figure 2, females who are obese were thirteen times more likely to develop Type 2 Diabetes Mellitus and were four times more likely to develop hypertension than their non-obese counterparts (National Audit Office, 2001). Males who are obese were five times more likely to develop Type 2 Diabetes Mellitus and were three times more likely to develop colon cancer than their non-obese counterparts.

Figure 2 Obesity and the risk of developing associated diseases among men and women

Estimated increased risk for the obese of developing associated diseases, taken from international studies

Disease	Relative risk - women	Relative risk - men
Type 2 Diabetes *	12.7	5.2
Hypertension	4.2	2.6
Myocardial Infarction	3.2	1.5
Cancer of the Colon	2.7	3.0
Angina	1.8	1.8
Gall Bladder Diseases	1.8	1.8
Ovarian Cancer	1.7	-
Osteoarthritis	1.4	1.9
Stroke	1.3	1.3

* Non-insulin dependent diabetes mellitus (NIDDM)

Note: The BMI range for the obese and non-obese groups used to estimate relative risk varies between studies, which limits the comparability of these data.

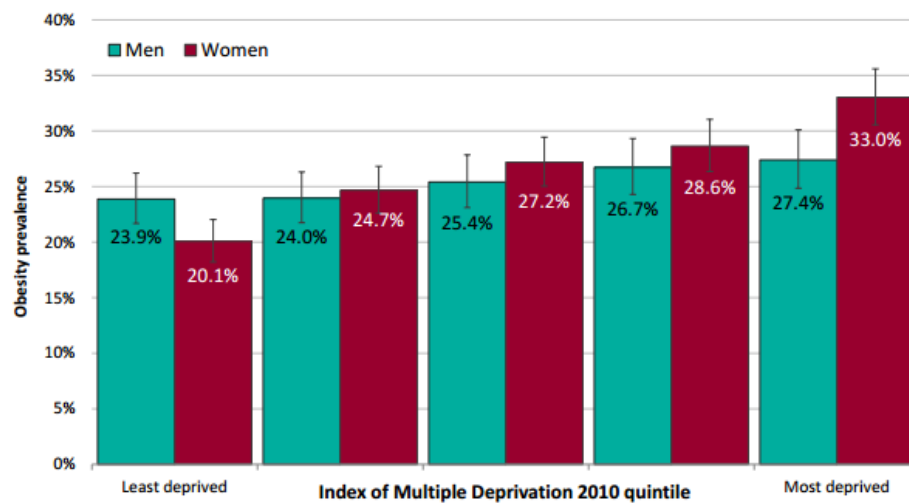
Source: (National Audit Office, 2001)

1.3.1 Socio-economic class and diet-related risks to morbidity

Lower-income households were not meeting the recommendations set forth by the UK government. Physical inactivity levels, obesity levels, rates of CVD and chronic health conditions all followed a socio-economic gradient with the highest rates in the lower socio-economic classes (HM Government, 2014, Public Health England, 2014, Salisbury et al., 2011). Diet quality and dietary intake also followed a socio-economic gradient with energy-dense, nutritionally poor foods purchased by lower socio-economic classes (Darmon and Drewnowski, 2008, Turrell and Kavanagh, 2006, Turrell et al., 2003, Turrell, 1998).

The prevalence of obesity was markedly different when separated by social class and levels of social deprivation. When obesity in the population was estimated through social deprivation and geographic location, the percentage of obesity seen in both males and females steadily increased [see Figure 3]. Obesity rates among the most deprived populations in England reached 27.4% for males and 33.0% for females.

Figure 3 Prevalence of obesity in adults (aged 16 and over) by deprivation quintile based on Index of Multiple Deprivation 2010¹



Source: (Public Health England, 2014)

Socio-economic class is also associated with the quality of dietary intake. The quality and quantity of food consumed varies by age and sex and when broken down by socio-economic factors, namely: occupation, education and income levels. There was a greater consumption of fruit and vegetables among adult individuals with a higher SES in countries across Europe, including the UK (De Irala-Estevéz et al., 2000). According to the Low Income Diet and Nutrition Survey (LIDNS) among the general population in the UK, consumption of saturated fats (SAT) and non-milk extrinsic sugars (NMES) was higher among low-income households (Nelson and Britain, 2007).

1.3.2 Multi-morbidity and social deprivation

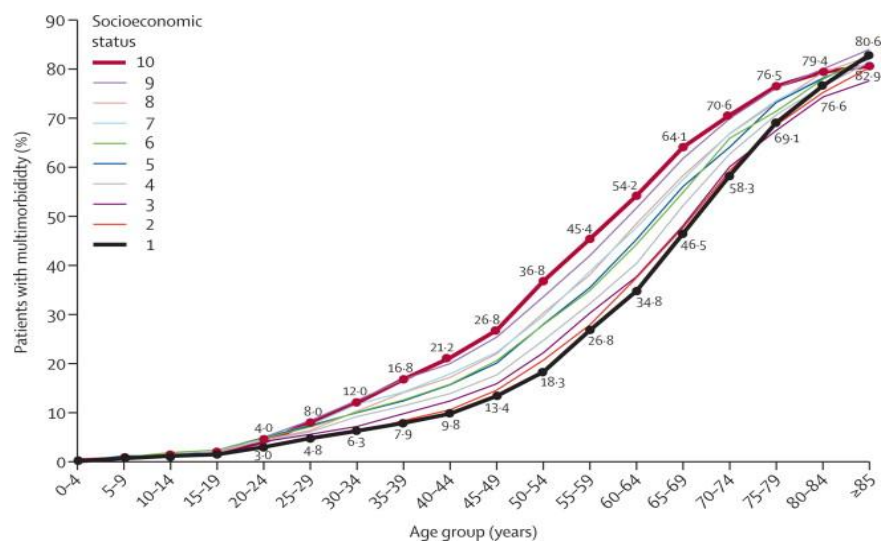
Lower income households experiencing economic hardship are more vulnerable to illness and poor health (Graham, 2009). In the UK, 14.6 million individuals had low household income in 2012/13, of which 8.7 million were working-age adults, 1.8 million pensioners and 4.1 million

¹ Index of Multiple Deprivation – deprivation scale based on income, employment, health and disability, education, skills and training, housing and services, crime and living environment in geographic area of residence

children (Carr et al., 2014). The average household income for those in the lowest socioeconomic classes was £374 per week.

There was also evidence of multi-morbidity in the UK general population. In a study of 1,751,841 patients from 314 medical practices in a database from Scotland, patients had multiple physical and mental conditions. When stratified by social deprivation however, the most deprived populations had higher rates of multi-morbidity among the aging populations than any other socioeconomic group [see Figure 4].

Figure 4 Multi-morbidity, economic status and age groups in Scotland (1=most affluent, 10=most deprived)



Source: (Barnett et al., 2012)

In a study of 99,997 adults from 182 medical practices in England, patients in deprived areas were almost twice as likely to have multi-morbidity, particularly among females in increasing age groups (Salisbury et al., 2011). Patients with multi-morbidity represented 16% of the population in the study, but accounted for 32% of all medical consultations among the patient sample. Furthermore, with increasing age, disadvantaged groups (particularly females) had multiple chronic health conditions that required more medical consultations.

1.4 Diet and nutrition related policies and recommendations in the UK

While increasing rates of overweight and obesity are a global public health challenge, it is a particular problem in the UK. Over recent decades, the UK government made an effort to tackle specific aspects of the growing obesity issue. The white paper entitled, *Healthy lives, healthy people: Our strategy for public health in England*, was issued in 2010 to approach the public health challenges in the UK by creating a national public health service, Public Health England (PHE) (HM Government, 2010b). Proposed action plans to improve wellness and well-being included the reformulation of food to reduce salt, better information for consumers about food and responsible drinking. In 2011, a report entitled *Healthy lives, healthy people: A call to action on obesity in England*, published new plans to tackle the obesity challenge; the government, who previously focused their efforts to reduce rates of child obesity, proposed a new plan to focus on the whole-population using a life course approach (Department of Health, 2011a). Policies and programmes to promote disease prevention were made to encourage physical activity, health and the ability to make informed choices. These policies included: food labelling, the Public Health Responsibility Deal, Change4Life and physical activity (Department of Health, 2013b).

The Food Standards Agency (FSA) in the UK implemented a salt reduction programme starting in 2003, due to the rising levels of adults with raised blood pressure (Health Survey for England, 2013). The programme involved working with the food industry to reduce salt levels in foods, create front-of-pack labelling for consumers to read easily and promote awareness through local campaigns. The salt reduction programme was implemented in an effort to lower general population blood pressure levels and ultimately, incidence of CVD. The recommended salt intake is 6 g/day for the adult diet (Scientific Advisor Committee on Nutrition, 2003).

Front-of-package labelling was altered to enable individuals to make informed, healthy choices by creating a consistent and easy-to-read colour-coded system. The nutritional information displayed the fat, saturated fat, salt, sugar and calories of the food products with red, amber and green colour-coding (HM Government, 2013b). Major food retailers and a number of food corporations joined the initiative and changed the nutritional information labelling of their products.

The Public Health Responsibility Deal was another approach to tackle the public health challenges in the UK. The deal encourages organisations to voluntarily pledge to increase healthy living in the UK general population in any one of the following areas: alcohol, food, health at work and/or physical activity (Department of Health, 2014c). Companies and organisations can offer various options to their employees or local communities such as healthier food choices, more opportunities to participate in sports, encourage responsible drinking or quit smoking initiatives. Other methods to take action are to reduce unhealthy ingredients in foods and encourage individuals to eat more fruit and vegetables. Calorie information can also be printed on menus in food establishments or reducing calorie intake by altering the portion size or the recipe of the product.

PHE began the Change4Life campaign (<http://www.nhs.uk/change4life/Pages/change-for-life.aspx>) in 2009 to get individuals and families involved in increasing physical activity and healthy eating by promoting healthy living. The incorporation of local supporters and partners enabled health improvement communications in the local community. Tips to guide healthy food choices such as the campaign '5 A DAY', the reduction of salt, sugar and fat, and food alternatives were made available through television, smartphone applications and social media and the main website.

Physical activity guidelines were issued in accordance with the policy, *Reducing obesity, improving diet*, to address the risk of ill health associated with lifestyle behaviours such as inactivity and sedentary activity (Department of Health, 2011c). The Department for Transport promoted walking and cycling when travelling and commuting to work (Department for Transport, 2014). The combination of physical activity and diet improvements sought to tackle overweight and obesity as a major public health challenge.

With the proposal of the life course approach to tackle public health and wellness in the population, re-assessment may be necessary to address particular groups in need of attention to their health and well-being issues. While the proposals by PHE are still in the early stages, further consideration to encourage specialised or focused care may maximise the impact of the public

health messages and recommendations that are disseminated to the public. One group to consider may be people receiving OST.

1.5 Vulnerable populations and NCD risks

Dietary behaviour was attributed to a majority of the risk factors to NCDs. Physical, social and economic characteristics linked with individual lifestyle characteristics contributed to environmental conditions that influence health. Across the socio-economic gradient, the incidence of chronic NCDs, multi-morbidity and premature mortality were higher according to higher levels of social deprivation. While the lower socio-economic classes were at higher risk of developing chronic health conditions, vulnerable populations, such as people who use drugs, may be at potentially higher risk. Vulnerable population groups may be susceptible to poor physical, psychological and social health (Aday, 2001).

Vulnerable populations and marginalised groups such as people who use drugs may be at higher risk of developing NCDs. Complex issues in areas such as physical health, mental health, accommodation, employment and support network can heavily influence lifestyle factors and behaviour (Arnold-Reed et al., 2014, Day et al., 2013, Salisbury et al., 2011, Jane-Llopis and Matytsina, 2006, Rodríguez-Llera et al., 2006, Weaver et al., 2003, Dobkin et al., 2002, Farrell et al., 2001, Gogineni et al., 2001, Mistral and Hollingworth, 2001, Brooner et al., 1997, Zanis et al., 1994, French et al., 1992, Regier et al., 1990, Hall et al., 1981). The environmental conditions that influence health can also affect dietary and digestive health, resulting in barriers and facilitators to lifestyle and behavioural choices.

In order to understand NCD risks in the case of people receiving OST in the UK, there is a need for original research. While previous research reported high rates of tobacco use (Pajusco et al., 2012, Nahvi et al., 2006, Richter and Arnsten, 2006, Díaz-Flores et al., 2004, Bogucka-Bonikowska et al., 2002, Tacke et al., 2001) and excessive consumption of alcohol (Rengade et al., 2009, Senbanjo et al., 2007, Hillebrand et al., 2001, Best et al., 1998) among people receiving OST, there was limited research of dietary behaviour and risks to health. Significant weight gain

and chronic illnesses among people receiving OST were reported in previous studies (Arnold-Reed et al., 2014, O'Toole et al., 2014, Cullen et al., 2009, Stein et al., 2008, Rajs et al., 2004), yet there was no evidence of dietary and lifestyle behaviours and their potential contribution to weight gain, development of NCDs and chronic health conditions.

Multiple risk pathways put people receiving OST at potentially higher risk of developing NCDs. Lower income households experiencing economic hardship are more vulnerable to illness and poor health (Graham, 2009). Vulnerable populations, such as people who use drugs, are at an increased risk of exposure to morbidity and premature mortality through shared social characteristics and their position in the social strata (Frohlich and Potvin, 2008). Factors such as education, occupation, gender and ethnicity that determine social position determine social disadvantage and vulnerability (World Health Organisation, 2011a).

1.5.1 Gastrointestinal effects of opioids

Opioids are commonly used in pain management and are associated with a range of gastrointestinal side effects. Methadone and buprenorphine share the same side effect profile. These drugs are widely used as a substitute in OST for the treatment of heroin use to inhibit withdrawal symptoms as part of a detoxification programme or maintenance programme. However, opioid analgesics also have known gastrointestinal side effects, frequently known as opioid-induced bowel dysfunction (OIBD) (Leppert, 2012). Patients who experience OIBD may have constipation, incomplete evacuation, hard dry stools, straining during bowel movement, abdominal distention, bloating, abdominal discomfort, gastroesophageal reflux, nausea and vomiting (Holzer, 2009, Holzer, 2007, Kurz and Sessler, 2003). Faecal impaction can also occur with symptoms such as rectal pain and swelling, bowel incontinence, anal bleeding or rectal prolapse. In a study of patients experiencing OIBD across the US and the EU, 45% of 322 patients reported less than three bowel movements per week (Bell et al., 2009). In a study of 2,430 individuals receiving opioids, 359 reported having symptoms consistent with OIBD and health-related quality of life scores that were significantly lower than those who did not have OIBD (Bell et al., 2008). Both studies reported a negative effect on daily activities and quality of life

among individuals with OIBD (Bell et al., 2009, Bell et al., 2008). Of a sample of 1009 patients and 889 of those receiving chronic opioids for pain management, 40% reported constipation, 25% reported sleeping problems, 23% reported loss of appetite and 18% reported sexual dysfunction, with more side effects reported by patients on daily opioid prescriptions (Brown et al., 2005). OIBD can also affect patients' quality of life and compliance as they may not adhere to prescribing procedures due to the deleterious side effects of opioid analgesics that can occur.

One of the recommendations to address OIBD is to use prophylactic measures and constipation therapy. The most common therapy is the administration of oral or rectal laxatives which can be of varying types: bulk-forming, osmotic, stimulant (Klaschik et al., 2003). Other types of therapies are stool softeners or lubricants. As a result of laxative use, side effects may occur such as nausea, vomiting, diarrhoea and abdominal pain. The current prophylactic therapy is that laxatives should be concurrently prescribed at the start time along with opioid therapy. Lifestyle changes such as increased fibre intake, increased oral fluids intake and increased physical activity may be recommended in conjunction with laxative therapies, however OIBD is known to be non-responsive or refractory to standard therapeutic approaches (Kumar et al., 2014, Pappagallo, 2001).

Symptoms such as nausea and vomiting can also affect food consumption and digestive health. Pain, swelling and bloating can alter appetite and motivation to consume food. Recovery capital in the drug policy literature can also incorporate dietary behaviours to address social care needs by understanding how dietary behaviours and digestive health can influence the accrual of recovery capital.

1.6 The influence of dietary behaviour to recovery capital

Dietary behaviour among people receiving OST may have a significant effect on the accrual of recovery capital, in the terms of the current drug strategy. As specified in *Recovery-orientated drug treatment policy* and *Building recovery in communities: a summary of the responses to the consultation* addressing social care needs along with health care needs increases the potential

effectiveness of recovery treatment (National Treatment Agency for Substance Misuse, 2012a, National Treatment Agency for Substance Misuse, 2011). In particular, the prevention of non-communicable diseases (NCDs) may influence the accrual of recovery capital by inhibiting the development of chronic health conditions that need regular medical care and treatment. Government public health and nutrition policies target the prevention of NCDs, including cardiovascular disease, Type 2 Diabetes Mellitus, respiratory disease and certain cancers. However, for people receiving OST, special consideration may be warranted.

Illnesses from NCDs can be detrimental to the accrual of human capital. Evidence from previous research suggested that people receiving OST may be at increased risk of rapid weight gain, which can develop into metabolic and physiological complications over the long-term (Okruhlica and Slezakova, 2008, Stein et al., 2008, Nolan and Scagnelli, 2007, Rajs et al., 2004, Szpanowska-Wohn et al., 2003, Gambera and Clarke, 1976). Co-morbidity and multi-morbidity in the form of multiple psychiatric disorders and/or physical health conditions in people receiving OST in addition to other physical health problems may also affect the potential to which the accrual of recovery capital is attained (Arnold-Reed et al., 2014, O'Toole et al., 2014, Jane-Llopis and Matytsina, 2006, Weaver et al., 2003, Farrell et al., 2001). Gastro-intestinal side effects from receipt of chronic opioids such as in OST can also impact quality of life and daily activities (Bell et al., 2009, Bell et al., 2008).

Cultural capital and its role in health can be used to explore every day health issues and their corresponding health outcomes by responding to social care needs. The acquisition of skills can improve human capital through the acquisition of diet-related skills knowledge which can, in turn, alter attitudes and beliefs of diet and nutrition. Cultural capital can be utilised to develop healthy lifestyle patterns through non-material resources such as gaining health knowledge and behavioural norms (Abel, 2008). These resources can then be used to effectively tackle broader wellness needs and improve the accrual of recovery capital in all four areas.

The accumulation of cultural capital among people receiving OST may be difficult with the presence of NCDs. The quality of individuals' lives diminishes when chronic NCDs are prevalent. Household earnings suffer through restricted employment or disability (Bloom et al., 2012,

Gwatkin et al., 1999). Socio-economic determinants to health, particularly poverty, can cause a vicious cycle that causes people who suffer from NCDs to remain in poverty (Leon and Walt, 2001). The combination of socio-economic factors, physical health and mental health conditions can create a complex situation within which to treat people receiving OST.

1.7 Overview

Drug use remains a significant public health problem. Current and historic drug policies have focused on behaviours directly involving drug use and recovery and have not focused on broader wellness issues such as diet and nutrition. Obesity rates are on the rise globally and the UK is not an exception to the public health challenge that is currently occurring.

People receiving OST may be particularly at risk of NCDs. While dietary recommendations to promote the reduction of obesity and further NCD risks have been targeted at the general population, a dietary policy recommendation that targets specific groups could be beneficial. Policy recommendations specifically modified for people receiving OST could be based on current general population's dietary and nutritional policy recommendations by accommodating for circumstances specific to people receiving OST. People receiving OST may also suffer from gastrointestinal effects as a result of their treatment that could severely affect their quality of life.

Chapter 2 Literature Review

2.1 Introduction

The objective of the current review is to identify the dietary intake patterns of people receiving OST from the current available information to determine the gap in the literature. This review considers the existing literature on people receiving OST. There is also relevant work from the wider body of literature on people who use opioids (and are not receiving OST). There have been a number of literature review published to date which are relevant to the current review. The chapter addresses the background literature and the existing reviews, followed by the search criteria and the results of the literature search.

2.2 Background

Disrupted dietary intake patterns were previously reported in people who use opioids and were not receiving OST (Saeland et al., 2011, Saeland et al., 2009, Himmelgreen et al., 1998, Morabia et al., 1989). Energy and caloric intakes of people who use opioids were similar to an age matched random control group due to higher intakes of refined carbohydrates, sucrose and alcohol. Participants consumed fewer meals in a week, particularly breakfast and dinner. Sleeping rough, financial constraints and environmental conditions resulted in infrequent meal consumption. Compared to general population figures, people who use opioids consumed higher amounts of sugar and sweet foods. They also had a lower vegetable and fruit intake than the general population. According to the previous research studies, an overall absence of essential nutrients could pose potential health problems and a higher risk of malnutrition over time.

A limited number of studies were conducted on people receiving opioid substitution treatment (OST) and their dietary intake patterns. Noble and McCombie (1997) conducted a literature review that investigated nutrition research studies related to people receiving OST. The review focused on nutritional status, nutritional deficiencies and major physical symptoms related to the

digestive system. A number of studies demonstrated higher risks of malnutrition through anthropometric measurement methods while also using albumin levels to check protein reserves. For example, Altés et al. (1988) reported that tricep skinfold measurements and albumin levels for males and females were lower than the general population; males showed a kwashiorkor-type malnutrition tendency and females showed a marasmus-type condition. Noble and McCombie (1997) concluded that there was a lack of research on dietary intake among illicit drug using populations, particularly those receiving OST.

The literature review by Noble and McCombie (1997) was comprehensive, but a number of studies have been published since 1997. Dietary intake studies were identified through dietary assessment methods. Studies that collected dietary data through other qualitative or quantitative research methods were also included. However, the review included unpublished Master's theses that could pose potential problems for subsequent reviews, particularly if systematic reviews were conducted and searches were unable to locate unpublished theses that are not identified in searches.

Nabipour et al. (2014) published a systematic review article that discussed opioid addiction and its epidemiology, dietary intake and nutritional status of people who use opioids and people receiving OST. Factors such as lack of nutritional knowledge, food preparation, and environment contributed to unhealthy eating behaviours. Nutritional education and physical activity were recommended during treatment. Nabipour et al. (2014) concluded that further studies that consider the impact of other external factors such as non-dietary determinants are required to enhance our understanding of people who use opioids and people receiving OST.

Though a systematic review by Nabipour et al. (2014) was published in 2014, the methods and inclusion criteria were not reported in the article. Also, the review had not considered qualitative studies of people who use opioids and they also incorporated studies of people who use opioids and contracted HIV which were reviewed separately by Hendricks and Gorbach (2009). The majority of the review article discussed opioids and the epidemiology of addiction and only briefly discussed dietary intake and nutritional status. The methods of the systematic review process

were not discussed at all. A replication of the search criteria is rendered nearly impossible without contacting the author.

2.3 Search criteria

PubMed, ISI Web of Science, CINAHL, PsychINFO and Cochrane Library were used to conduct the search. Key search terms included 'heroin' 'opioid' 'opiate' 'drug user' 'methadone' 'buprenorphine' 'food' 'diet' 'nutrition' 'eating' 'eating patterns' and 'food intake'. The terms were refined into MeSH terms for PubMed. Search terms were combined with appropriate Boolean logic and truncation.

2.3.1 Inclusion and exclusion criteria

Studies were included if they reported dietary intake through dietary assessment methods (e.g. food frequency questionnaire (FFQ), 24 hour dietary recall interviews (24HR), food diaries or dietary intake), through other quantitative or qualitative methods (e.g. qualitative interviews, eating behaviour questionnaires) and reported macro-/micro-nutrient results, eating events and/or eating behaviour. Only articles in English were reviewed.

The subject population in all studies had used illicit opioids and were receiving prescribed methadone or buprenorphine at the time of the study. There was no distinction made between people who used opioids and people who injected opioids in the search. Literature that addressed people who used opioids and contracted HIV and/or nutritional status through blood sampling and body composition of people receiving OST were excluded as reviews in these areas were already conducted (Hendricks and Gorbach, 2009, Noble and McCombie, 1997). Table 2 refers to the nine reviewed studies.

2.4 Results

Thirteen documents were retrieved through the search, of which four were excluded. Two papers were not in English (Szpanowska-Wohn et al., 2004, Szpanowska-Wohn et al., 2000) and two papers were conference presentation abstracts without a full text article (Ferro-Lebres et al., 2012, Tallman et al., 1984).

The studies provided comparable results. The consistent findings among studies were: i) insufficient dietary/nutrient intakes and ii) higher refined carbohydrates/sweet foods consumption. Reported findings varied in the areas of: i) problematic or moderate alcohol intake, frequent or irregular daily eating events, and normal or overweight subject Body Mass Index (BMI).

2.5 Consistent findings in the literature

2.5.1 Insufficient dietary/nutrient intake

Dietary intake for people receiving OST was insufficient for particular foods, vitamins and minerals in six studies (Kolarzyk et al., 2010, Kolarzyk et al., 2005b, Kolarzyk et al., 2005a, Zador et al., 1996, Gambera and Clarke, 1976). In a United States study, Gambera and Clarke (1976) noted that intakes of fruit and vegetables, meats, whole grain and enriched cereals did not meet the recommended allowance. Three-quarters of 19 females in the study had inadequate intakes of three or more nutrients in their diets and had less adequate diets than the 40 males in the study. Findings from an Australian study conducted by Zador et al. (1996) also reported inadequate intakes of red meat, breakfast cereals, whole grain breads, fruits and vegetables among 86 females receiving OST. Furthermore, none of the 30 OST recipients in the Portuguese study by Alves et al. (2011) met the Food Pyramid recommendations for daily recommended servings of fruits (two servings), vegetables (three servings) and grains (six servings).

A Polish OST recipient group (23M, 7F) was assessed by Kolarzyk et al. (2005b) at three examinations over four years. The study reported the consumption of specific products such as

cream, peas and beans, and vegetables decreased from 'moderate' consumption (\leq three times per week) to 'rare' consumption (once a week). Butter, fruit juices, meat, milk and yoghurt increased from 'moderate' consumption to 'often' consumption (greater than three times per week). The authors noted there were no statistically significant changes in taste preference over the four years. Interestingly however, nutrition findings from the same sample population demonstrated that females met the majority of the nutrient recommended values after four years receiving OST (Kolarzyk et al., 2005a). Insufficient intake was observed in seven nutrients prior to treatment among females (dietary fibre, vitamins A and B₁, calcium, iron, zinc and magnesium). After four years, females' nutrient intake was sufficient in all but two nutrients (vitamin B₁ and iron) after four years. Males however, demonstrated insufficient intakes in eight nutrients (carbohydrates, dietary fibre, vitamins B₁, B₂, and C, niacin, calcium and magnesium) prior to treatment. At the four year follow-up, males remained deficient in six nutrients (vitamins B₁, B₂ and C, niacin, calcium, iron, magnesium and zinc).

Magnesium and zinc nutrient sufficiency were observed by Kolarzyk et al. (2010) in a five year Polish study of people receiving OST (23M, 12F) in an OST programme. Prior to treatment, males and females demonstrated lower intakes of copper (59% and 43%), magnesium (71.5% and 74.2%) and zinc (69.1% and 79.2%) from a $\pm 10\%$ of 100% total intake assessment. At the five-year follow-up, males' intake of copper, magnesium and zinc remained below the recommended values (53.5%, 78.9% and 67.8% respectively). An increase in magnesium and zinc (112.9% and 111.0%) was observed in females' intake while copper levels remained below the recommended value (62.5%). The authors noted that there were no previous findings for people receiving OST in a longitudinal study of copper, magnesium and zinc.

2.5.2 Higher refined carbohydrates/sweet foods consumption

Four studies reported higher sugar, sweets or junk food consumption (Alves et al., 2011, Nolan and Scagnelli, 2007, Kolarzyk et al., 2005b, Zador et al., 1996). High sugar consumption was reported among 86 Australian female OST recipients than their general population counterparts (Zador et al., 1996). Total daily carbohydrate intake was 64% and total energy intake was 31%.

The total average sugar intake was 122 g/day. The group's intake derived from refined sugars added to beverages, cordial drinks and fizzy drinks (52%) or confectionary, biscuits and ice cream (no percentage given). These values were higher than the general population figures for Australian females of a similar age range (48% total daily carbohydrate intake and 101g average daily total sugar intake). An US study conducted by Nolan and Scagnelli (2007) reported higher consumption of sweet foods, junk foods and snack foods among 15 methadone maintained patients when compared to 14 age and gender matched controls. Higher consumption of total sweets per day (5.63 ± 2.1 servings/day) was also reported in the Portuguese study of Alves et al. (2011). The authors noted that there were no statistically significant differences when the OST recipient group data was analysed by socio-demographic or employment factors.

Higher sweet foods and beverages consumption was also observed by Kolarzyk et al. (2005b). Cakes and lemonade were in the 'rare' consumption category (once a week) prior to OST and increased to the 'moderate' consumption category (\leq three times a week) after four years receiving OST. Chocolate was in the 'often' consumption category (greater than three times a week) prior to treatment. Chocolate consumption in particular differed from previous examinations, moving from the 'often' consumption category prior to treatment, to the 'moderate' consumption category at the last examination. According to the authors, there was a reduction in the overall consumption of sweet foods after four years.

2.6 Varied findings in the literature

2.6.1 Problematic or moderate alcohol intake

Four of the nine studies reported alcohol consumption in their results. Best et al. (1998) reported alcohol drinking among 52 out of 100 subjects while receiving OST. Of those, only seven subjects reportedly drank within the safe limits: 21 UK units per week for men and 14 UK units per week for women. OST recipients that drank alcohol had significantly fewer eating occasions than their non-drinking counterparts.

In contrast, moderate alcohol consumption among people receiving OST was also reported (Alves et al., 2011, Zador et al., 1996). Seventy-seven percent of 86 female subjects reported no alcoholic drinks on the days of the 24HR. Mean alcohol intake per day was 8.2 g. Moderate alcohol intake was reported among 49 subjects receiving OST in the Alves et al. (2011) study. Mean alcohol intake was 20.37 ± 25.4 g/day which accounted for $6.07\% \pm 5.5$ of total energy intake.

Decreased levels of beer consumption was observed in the Kolarzyk et al. (2005b) study of 30 people receiving OST after four years in the programme. Prior to treatment beer was in the 'moderate' consumption (≤ 3 times a week) category and decreased to 'rare' consumption (once a week) after four years. Though there were other alcoholic beverages listed (i.e. vodka, wine), there was no significant change in consumption and no particular observations noted by the authors.

2.6.2 Frequent or irregular daily eating events

Frequency and irregularity of eating events and types of eating (e.g. meals or snacks) differed among the studies. One-third of the OST group in the Gambera and Clarke (1976) study consumed three or more meals a day compared to one or two meals a day consumed by the subjects in detoxification. More frequent daily eating occasions were also reported by Nolan and Scagnelli (2007). Subjects receiving OST were eating three meals daily on a more frequent basis than the age and gender matched control group. Interestingly, in the Alves et al. (2011) study three or more meals were consumed among employed subjects (3.19 ± 1.1 meals/day); however the unemployed group consumed fewer meals a day (2.27 ± 0.9 meals/day) and consumed larger amounts of fats (32.27 ± 7.29 g/day) than their employed counterparts (23.55 ± 3.8 g/day).

Additionally, Kolarzyk et al. (2005b) reported a change in food frequency consumption of people receiving OST over four years. At the initial examination, 20 products were rarely consumed (once a week), out of 41 products. At the subsequent examinations, a steady decrease in rarely consumed products was reported. Products that were moderately consumed (≤ 3 times a week) drastically increased from nine to eighteen products after nine months, increasing to 20

products at the four year follow-up. The foods that were consumed often (greater than three times a week) were stable over time.

In contrast, people receiving OST were also found to eat less often than the general population in previous studies (Neale et al., 2012, Best et al., 1998, Zador et al., 1996). Eating occasions (meals or snacks) were assessed in the study of Best et al. (1998). Three percent of 100 participants consumed no food at all. The remaining 97% had an average of 4.7 eating occasions in the previous three days. Sixty-three percent ate less than six times in the same period. In the Zador et al. (1996) study, twenty-seven percent of 86 Australian females receiving OST reported having no cooked meals and 36% reported having three or more cooked meals from two 24HR. Moreover, Neale et al. (2012) reported that food was reportedly low on the priorities list and people receiving OST struggled to eat one or two meals a day. Participants also rarely ate breakfast or replaced breakfast with a cigarette and a cup of tea or coffee with added sugar (Neale et al., 2012, Zador et al., 1996).

2.6.3 Normal or overweight subject BMI

Mean BMI findings differed among the studies, ranging from normal to overweight. Normal BMI was reported as (18.5-24.9 kg/m²). Nolan and Scagnelli (2007) reported that the mean BMI of OST recipients (28.85 ± 2.14 kg/m²) was significantly higher than the control group (22.84 ± 0.85 kg/m²). The authors reported no significant differences in BMI between males and females in the OST group.

In contrast, Alves et al. (2011) reported a mean BMI of 22.48 ± 3.47 kg/m² among people receiving OST. The authors however, reported significant differences in mean BMI in people receiving OST who lived with a spouse (25.03 ± 3.93 kg/m²) than other housing environments (21.74 ± 2.99 kg/m²). According to the researchers, the higher BMI among people receiving OST who had a spouse was reportedly attributed to the presence of a caretaker. Togetherness stimulated motivation to prepare and eat meals together. In the Australian study, Zador et al. (1996) noted a mean BMI within the acceptable range for 76 females receiving OST. Ten females were

excluded due to pregnancy. The mean BMI was 22.7 kg/m² (range 16.2-43.4 kg/m²). Fifty-nine percent of subjects were within the 20-25 kg/m² BMI range.

Additionally, Kolarzyk et al. (2005a) examined BMI in people receiving OST at baseline (prior to treatment) and found both groups of males and females were within the acceptable range. The mean BMI of females at baseline was 20.3 ± 1.5 kg/m² and the mean BMI of males was 23.3 ± 5.3 kg/m². After five years receiving OST, the mean BMI of the female group decreased to 19.8 ± 2.7 kg/m² however, for the males, the mean BMI increased to 25.5 ± 7.9 kg/m². The males' mean BMI from baseline exceeded the normal BMI range (18.5-24.9 kg/m²) to the pre-obese class (25-29.9 kg/m²) at follow-up.

2.7 Critical assessment of the literature

The studies in the review used a variety of research methods to collect data and there was no standard set of methods widely adopted. Standard methods such as 24HR, food diaries and food frequency questionnaires were used by seven studies (Alves et al., 2011, Kolarzyk et al., 2010, Kolarzyk et al., 2005a, Kolarzyk et al., 2005b, Best et al., 1998, Zador et al., 1996, Gambera and Clarke, 1976). Ma et al. (2009) concluded that a minimum of three 24HR was required to more accurately represent energy intake in the diet. While the methods for 24HR data collection for two studies conducted by Kolarzyk et al. (2005a, 2010) could accurately represent dietary intake in their patient sample, studies by Gambera and Clarke (1976) and Zador et al. (1996) collected two 24HR or less. The individuals' energy intake quoted in these papers therefore may have been less accurate.

Best et al. (1998) used a three-day food diary to collect data about food eating and meals. From the description of their methods, it was unclear how the food was recorded. While there is a standard three-day food diary to record food in dietary intake methods, the interview method that was used in the Best et al. study, which asked participants to recall their eating over the previous three days, may have had limitations. The study did not consider how weekend eating compared to weekday eating and the changes that may result. The researchers could have separated each

food interview to collect food data each day for three days (including a weekend day) rather than in one meeting.

The data samples for six studies had small sample sizes, limiting generalisability to a larger sample population (Alves et al., 2011, Kolarzyk et al., 2010, Nolan and Scagnelli, 2007, Kolarzyk et al., 2005a, Kolarzyk et al., 2005b, Gambera and Clarke, 1976). This may be due to small sample sizes available and high attrition rates in treatment centres and research studies of people who use opioids and other illicit substances (Loveland and Driscoll, 2014, Stark and Campbell, 1988)

Six studies used recommended dietary allowances used in their respective countries to compare dietary intake data of the sample group (Alves et al., 2011, Kolarzyk et al., 2010, Kolarzyk et al., 2005a, Kolarzyk et al., 2005b, Best et al., 1998, Gambera and Clarke, 1976). While comparison to dietary recommended values can be useful, comparison to general population figures can also provide information about dietary trends in intake such as high sodium or high saturated fat intake that may be found in the general population. It would be helpful to identify similarities and differences in intake to general population figures or controls, as it may indicate gaps in knowledge and/or areas to consider for further research. Trends in the study samples that are found in the general population can also inform if a targeted intervention is appropriate.

The study by Zador et al. (1996) collected data from females only. However, it is unclear whether the data from the dietary intakes from ten pregnant females out of the total sample size of 86 females in the study could have influenced the results due to the dietary restrictions that are recommended to avoid complications in pregnancy. The pregnant females in the study may have variable dietary intakes that differ from periods when they are not pregnant.

While Nolan and Scagnelli (2007) collected eating habit data in their study. However, the eight specific food items listed in the questionnaire had an unbalanced range of foods, a majority of which were junk foods. Three items were: tuna salad, salad and meat. The other five items were: pizza, potato chips, sweets (chocolate, candy, dessert). Instead of a narrow range of foods such

as eight items, a food frequency questionnaire may have captured a broader range of foods to determine a closer representation of an individual's eating habits.

2.8 Discussion

Disrupted dietary intake patterns were found in the majority of the studies. However, factors such as time in treatment, concurrent substance use, and socio-demographic background were all areas to consider further.

Longitudinal studies provided a means to track the changes in the diet of people receiving OST. In the two Polish studies (Kolarzyk et al., 2005a, Kolarzyk et al., 2005b), at baseline, dietary and nutrient intakes of people receiving OST were insufficient. However, after four or five years receiving prescribing interventions the dietary and nutrient intakes of people receiving OST met more of the recommended nutrient allowances and were deficient in fewer nutrients than at baseline. However, the effect of external factors must be considered. According to the authors, a reformation of food consumption patterns occurred in the 1990s in Eastern Europe (Kolarzyk et al., 2005a). Significant dietary changes that occurred in the general population also reflected in their results, particularly among the females receiving OST. From the reported findings, females receiving OST had a higher risk of nutrient deficiencies than males at one time point. With limited longitudinal studies of dietary and nutrient intake, it is difficult to establish any further conclusions between long-term use of prescribing interventions in OST and dietary intake patterns. The results reported by the Polish researchers in the three longitudinal studies (Kolarzyk et al., 2010, Kolarzyk et al., 2005a, Kolarzyk et al., 2005b) warrant further research in the area.

Several studies (Zador et al., 1996, Gambera and Clarke, 1976) reported higher risks of nutrient deficiencies among females receiving OST. Gambera and Clarke (1976) noted that females receiving OST were at an increased risk of nutrient deficiency as compared to their male counterparts. Parallels in reports of people who use opioids found females to be at higher risk of nutrient deficiency or malnutrition (Saeland et al., 2009, Himmelgreen et al., 1998, Morabia et al., 1989). However, females receiving OST had improved nutrient intake over time whereas their

male counterparts did not (Kolarzyk et al., 2010, Kolarzyk et al., 2005a). Differences in the diets of males and females receiving OST remain interesting for further study.

The mean BMI of subjects in the studies varied between normal and overweight categories. There were no reports of average BMI in the underweight or obese categories. Further, the mean BMI of male subjects in the Polish study (Kolarzyk et al., 2005a) were found to increase above the normal range (upper limit is 24.9 kg/m²) after receiving OST for five years. This is in contrast to studies that reported associated lower mean body weight or BMI with HIV positive or negative in people who use opioids (Islam et al., 2002, McCombie et al., 1995, Santolaria-Fernández et al., 1995, Aylett, 1978). Studies also reported a normal to overweight mean BMI, noting high rates of pre-obese people who use opioids (Rajs et al., 2004, Fugelstad et al., 2003). A study by Stein et al. (2008) found increasing obesity rates among people receiving OST upon the first year of treatment in a US study. The study by Rajs et al. (2004) noted that socio-demographic conditions by region may be a factor to consider when conducting research due to differences in health care and treatment access by country. The complexity of the situation requires further research to understand the BMI of people receiving OST, particularly by region and socio-demographic status.

Alcohol use affected the dietary intake patterns of people receiving OST in a UK study (Best et al., 1998). The results presented by Best et al. (1998) was the only study that reported higher levels of alcohol consumption and the effect on dietary intake. However, studies of people receiving OST have reported higher levels of alcohol consumption (Rengade et al., 2009, Senbanjo et al., 2007, Hillebrand et al., 2001, Stastny and Potter, 1991). General population cohort studies also reported disrupted dietary intake patterns from heavier alcohol consumption (Breslow et al., 2010, Veenstra et al., 1993). Alcohol consumption in Portugal and Australia did not report higher intakes of alcohol, but previously reported findings were still limited. It seems that further research would benefit from recording alcohol consumption and its effect on dietary behaviour.

Finally, several studies noted higher consumption of sweet foods in people receiving OST compared to the general population. Previous studies noted impaired glucose metabolism in

people who use opioids (Ceriello et al., 1987, Passariello et al., 1986). Impaired glucose metabolism, heavier alcohol consumption, higher BMI and a higher consumption of sweet foods suggested an increased susceptibility to Type 2 Diabetes Mellitus (Mysels and Sullivan, 2010, Howard et al., 2004). These factors may add to the health burden in people receiving OST. A further assessment of the risk factors to diabetes in this particular population would be useful for future research.

People receiving OST are at a risk of insufficient dietary intake and nutrient deficiencies. Longitudinal studies have suggested changes in the course of receiving treatment, although there may be gender differences. Alcohol use affected the dietary intake patterns in people receiving OST, however evidence is still limited. Findings may also vary by region, particularly with food consumption behaviour, alcohol use and subject BMI. Further research is needed to explore these factors in people receiving OST in the UK.

Table 2 Characteristics of dietary intake studies in people receiving OST

Author/year of publication	Country	Sample Size <i>N</i> (M, F)	Dietary assessment method	Controls	Results	Critical Assessment
(Neale et al., 2012)	UK	Methadone or buprenorphine <i>N</i> 10 (5,5) Detoxification <i>N</i> 10 (5,5) Residential rehabilitation <i>N</i> 10 (5,5) Free from illicit or prescribed opioids <i>N</i> 10 (6,4)	Semi-structured qualitative interviews	No controls	Eating more than one or two meals a day was a struggle Subjects rarely consumed breakfast Calories were consumed late at night Occasional bingeing Nutritional intervention is needed	Difficult to assess the stage when receiving OST for the purposes of the current study No exploration of how food traditions and food knowledge may have influenced perspective of food
(Alves et al., 2011)	Portugal	Methadone <i>N</i> 49 (43,6)	Food frequency questionnaire Anthropometric measurements (weight and height) Interviews	No controls (Recommended daily allowance from the Food Pyramid)	71.4% had a BMI within the acceptable range Unemployed subjects consumed more fat and ate fewer meals per day than employed subjects Higher average consumption of sweets among all subjects Socio-demographic conditions was an important factor to consider	It is unclear what type of questionnaire was used to gather what data in the study A detailed discussion of the methods is required to understand how the data was collected Discussion of results presents cultural and/or social presumptions with no evidence

Author/year of publication	Country	Sample Size N (M, F)	Dietary assessment method	Controls	Results	Critical Assessment
(Kolarzyk et al., 2010)	Poland	Methadone N 35 (23, 12)	24 hour dietary recall Three non-consecutive days	No controls (Daily nutritional values for Poland)	Five year longitudinal study Prior to treatment: Males: copper (59%), magnesium (71.5%) and zinc (69.1%) Females: copper (43%), magnesium (74.2%) and zinc (76.2%) five year follow-up: Males: copper (53.5%), magnesium (78.9%) and zinc (67.8%) Females: copper (62.5%), magnesium (112.9%) and zinc (111.0%) Correction of nutritional behaviours can be part of multi-dimensional care in improving physical and mental health	Could have interviewed the participants about their environment and the barriers and facilitators to food and eating to understand food choices and dietary intake

Author/year of publication	Country	Sample Size <i>N</i> (M, F)	Dietary assessment method	Controls	Results	Critical Assessment
(Nolan and Scagnelli, 2007)	USA	Methadone <i>N</i> 14 (5, 9)	Eating behaviour rating questionnaire	Controls (age and gender matched) <i>N</i> 14 (4, 10)	<p>Methadone recipients: consumed larger amounts of sweets, snacks and junk food Consumed three more meals than the control sample Showed a higher eagerness to eat dessert, candy, chocolate and pizza Reported healthier lifestyles and higher BMI than the control sample Link between food and drugs merited further investigation</p>	<p>Self-report of height and weight may not be accurate No socio-demographic characteristics such as housing, employment or social network</p>

Author/year of publication	Country	Sample Size <i>N</i> (M, F)	Dietary assessment method	Controls	Results	Critical Assessment
(Kolarzyk et al., 2005a)	Poland	Methadone <i>N</i> 30 (23,7)	24 hour dietary recall Thre non-consecutive days	No controls (Daily nutritional values for Poland)	Four year longitudinal study Prior to treatment: Females: low intakes of fibre, vitamins A and B ₁ , calcium, iron, magnesium and zinc Males: low intakes of energy, carbohydrates, fibre, vitamins B ₁ , B ₂ , and C, niacin, calcium, iron, magnesium and zinc Four year follow-up: Females: low intakes of vitamin B ₁ and iron Males: low intakes of vitamins B ₁ , B ₂ , and C, niacin, calcium, iron, magnesium and zinc	The sample size for females is too small to be representative Could also be compared to the dietary and nutrient intake of the general population if evidence is available

Author/year of publication	Country	Sample Size <i>N</i> (M, F)	Dietary assessment method	Controls	Results	Critical Assessment
(Kolarzyk et al., 2005b)	Poland	Methadone <i>N</i> 30 (23,7)	Food frequency questionnaire	No controls	Four year longitudinal study Prior to treatment: more frequent consumption of sweets, particularly chocolate and lower consumption of complex carbohydrates, fish and vegetable fats Four year follow-up: Less frequent consumption of sweets, consumption of cereals, animal products, fish, fruit and juices was still infrequent	Validation of food frequency questionnaire Small sample size, particularly for females
(Best et al., 1998)	UK	Methadone <i>N</i> 100 (73, 27)	Three-day food diary including alcohol and tobacco use	No controls	27% had no cooked meals 36% had three or more hot cooked meals Alcohol consumption: an average of 250 units the preceding month 93% smoked an average of 17.6 cigarettes daily Lifestyle variables need to be understood for more effective treatment	Three day diary method to recall food, alcohol and drug intake is difficult for participant to remember all at once High likelihood to forget items No consideration of weekend days and differences in intake No consideration of intake on pay day and the time to pay day and how these periods differ

Author/year of publication	Country	Sample Size N (M, F)	Dietary assessment method	Controls	Results	Critical Assessment
(Zador et al., 1996)	Australia	Methadone N 86 (all females)	24-hour dietary recall	General population figures for Australia	<p>Lower intakes reported: red meat, breakfast cereals, whole grain breads, fresh fruits and vegetables</p> <p>Higher intakes reported: refined carbohydrates, milk and dairy products</p> <p>Cravings for sweet foods as described by subjects</p> <p>Disrupted energy intake but BMI was within the acceptable range</p>	<p>Only females in the study, difficult to assess gender differences</p> <p>Two dietary recalls is not enough to capture accurate dietary intake</p> <p>Inclusion of pregnant women in the study</p> <p>Pregnant women have food restrictions and may change their diet from normal settings</p>

Author/year of publication	Country	Sample Size N (M, F)	Dietary assessment method	Controls	Results	Critical Assessment
(Gambera and Clarke, 1976)	USA	Methadone N 40 (29, 11) Detoxification N 19 (11, 8)	Food habits questionnaire 24HR	No controls (Recommended dietary allowance used)	<p>Lower intakes reported: fruits, vegetables, whole grain, cereals, and bread</p> <p>Methadone recipients: improved appetite, weight, and meal consumption</p> <p>Detoxification: fewer meals and poorer nutrient intake than those on methadone</p> <p>In both groups, females consumed less adequate diets than males</p> <p>Need for nutritional counselling</p>	<p>Unclear if the sociodemographic data was collected by qualitative interview or questionnaires in an interview format</p> <p>The number of 24HR is unclear</p>

Chapter 3 Theoretical background

3.1 Introduction

The consumption of food fulfils a primary need for survival, yet there are diverse methods to fulfil this biological need. While food consumption has always provided nourishment and the essential nutrients to sustain life and stimulate growth, the acquisition, preparation and consumption of food has changed over the centuries through innovation and adaptation by humans. Food choice and eating behaviours are firmly incorporated in culture, tradition and society. As expressed by Rozin (2010, p. 393), "Food is the one biological system that has been massively transformed by culture into a range of meanings and practices, cuisines, social events, such that the nutritional function of food is often overshadowed by its social functions." Individuals may choose to consume a variety of foods that are available to them, but their goal in this context is not necessarily to choose foods that are optimal for their health or biological fitness; the symbolism and the social context of food enable social connections, interaction and communication among individuals.

Behaviour and learned practices are transmitted through the generations - by families, culture, religion and material artefacts. The attitudes and behaviour of individuals in relation to food are learning processes within the structure of their own society and culture (de Garine, 2004). The introduction of new traditions may occur through learned experiences, exposure to social traditions of other cultures or media and television. Individual households may have varying eating practices such as table manners, eating times, eating place, social interaction while eating, or lack thereof. However, nationally and culturally recognised dishes may have differing ingredients due to the regional availability of food. Variation by the inclusion and exclusion of new ingredients can also modify a dish through dietary restrictions, personal innovation or seasonal variation. The distinctive use of new ingredients may then become a cultural tradition through transmission to the successive generations.

Food choice is rapidly altered due to the sheer availability and variety of foods that are offered. Globalisation of food industries and the commercial availability of food itself have greatly changed food-related behaviour. The food choices individuals make can affect other individuals, while further affecting regional and national economies, international trade and transnational corporations (Robinson and Harris, 2004). Foods are imported and exported worldwide and are now available all year round rather than seasonally. Fast food chains and the availability of processed, frozen and ready-made meals in supermarkets revolutionised food production and availability through large-scale manufacturing.

Individuals are also able to build upon their food choices through information exchange. The evolution of food movements and the influence of media are other areas that build upon food choices, preferences and behaviour. Food movements play upon food cultural history by causing a change in food trends and food demands. In recent decades, the organic and fair trade movements, gastronomy and the slow food movement revolutionised how individuals envisage the global food system through social and political movements (Raynolds, 2012, Andrews, 2008). Localised cuisines that are specific to a cultural tradition are now available on an international scale through the dissemination of recipes, ingredients and cooking methods through media outlets such as social media, television and the internet.

Food and eating behaviour may be altered for various reasons, through social and cultural experiences from childhood, the commercialisation and convenience of foods, the physical environment, and the thought processes and beliefs that determine individuals' food preferences. For people receiving OST, it is also important to recognise the barriers that may occur due to lifestyle factors and drug use. Food insecurity, mental health and physical health factors may change food-related behaviour significantly. For the purposes of the current study, there is no evidence of previous application of a theoretical framework to understand the food-related behaviour of people receiving OST. A theoretical framework that both considers the scope of individual and environmental circumstances would suit an exploratory study to inform policy, practice and research implications.

3.2 Previous application of theoretical models to food behaviour studies

Dietary behaviour research studies previously applied theoretical models in the fields of health promotion and health education. Various models were used to understand individuals' dietary behaviour such as: the transtheoretical model (TTM), attitude-social influence efficacy (ASE) model, social cognitive theory (SCT), planned behaviour model (PBM), the theory of reasoned action (TRA) and the health belief model (HBM).

TTM is a behavioural theory that was used to determine methods of behaviour change (Prochaska and DiClemente, 1982) and in food choice and fruit and vegetable consumption (Armitage et al., 2004, Horwath, 1999, Van Duyn et al., 1998). Six stages of change form the basis for the model: precontemplation, contemplation, preparation, action, maintenance and termination (Prochaska, 2013). The model can be used to assess the readiness of individuals first from the initial stage of precontemplation. Behavioural intentions are assessed over the next 6 months. Individuals in this stage may not intend to take action, while others may not be aware of the outcomes to their behaviour. Individuals who are ready to engage in behaviour change over the next six months may be aware of the positive benefits to behaviour change, but are conflicted. In the case of dietary behaviour, individuals may be aware of foods that negatively impact their health over the long-term, but are not ready to give up or change their diets.

The preparation stage of TTM involves individuals who will engage in behavioural modifications over the next month. Individuals in this stage are focused on taking action, but also concerned about failure to effectively engage in changing their behaviour. Individuals in the action stage have already changed their behaviour and work to continue progressing. Relapse is more likely to occur during the action stage. The maintenance stage occurs after six months to five years after engaging in the progression of behaviour modification. The final stage is the termination stage when individuals are free of their high-risk behaviour and are confident they will not return.

While TTM is an effective model for interventions to treat multiple behaviours, the determinants to understand the behaviours that require change are not well understood in people receiving OST and their dietary behaviour. However, TTM has been effective in treating populations with multiple health risk behaviours (Prochaska et al., 2006). Though another model to understand the determinants to understand food consumption patterns is needed, the stages from the TTM may be an effective model to determine practice implications and understand how to pragmatically engage with people receiving OST through each stage of TTM.

SCT has also been used to investigate the determinants to behaviour change in health practices (Bandura, 2004), and in nutrition behaviour (Anderson et al., 2007, Rinderknecht and Smith, 2004, Reynolds et al., 1999). Knowledge and awareness of health related risks and benefits determine self-efficacy. Perceived self-efficacy of individuals determines the extent to which one can engage in behaviour modifications and exercise control over health-related risk behaviour. Outcomes of these behaviour modifications are expected by the individuals themselves. Changes that produce self-satisfaction, self-worth and positive social reactions encourage and motivate individuals to continue with their progress. Impediments may exist that pose challenges and reduce motivation to continue to perform the modified behaviours.

SCT may be a potential model to determine the factors to include in an intervention. The model itself is comprehensive to assess behaviour change and the positive and negative aspects of regulating these changes. The model also incorporates the structure of the health system and aspects such as economic determinants to investigate how best to regulate health promotion behaviours. SCT may be the most comprehensive model to determine effective health practices for people receiving OST. Further investigation is needed prior to the implementation of any intervention to change health behaviours.

Other theories which were previously applied to food choice, food preferences and food behaviour include TRA (Ajzen and Fishbein, 1980), TPB (Ajzen, 1991) and HBM (Rosenstock, 1974). These theories focus on the individual's experiences in the past while also recognising knowledge, beliefs, attitudes, behaviours and intentions. By understanding the motivations, barriers, social influence and incentives, there is grounding to predict food choice processes of individuals.

Research that previously examined food choice and food behaviour attempted to measure motivational forces in clinical settings or measured variables by isolating the intention of specific behaviours in the investigations. Using TRA and PBM, variables or goals were categorised as proximal and distal (Ajzen, 1991, Ajzen and Fishbein, 1980) and motivational forces and intentions then determined attitudinal influence and behaviour. Previous studies explored areas such as fish consumption (Verbeke and Vackier, 2005), fat intake (Shepherd and Towler, 1992) and milk consumption (Brewer et al., 1999) to understand attitudes and beliefs toward foods, even adding sensory evaluation to more accurately predict food-related behaviours in a general population sample. HBM was also used to examine the likelihood of eating and food-related behaviour in studies of the adult population, particularly university age young adults (Deshpande et al., 2009).

One particular critique of the understanding of attitudes and behaviours related to food choice and food preference in clinical settings is the fluidity and potential for change. Individuals' food choices may change due to any one aspect of their lives, whether by a change in the season, medical reasons, a successful relationship or a failed one. Appetite can change on a daily basis, even at different times in a day. The interaction of individuals within their group also determines their food choices at one point in time. All of these external forces can influence attitudes and behaviour toward foods. These three models underestimate the embedded nature of eating in individuals' daily lives.

Conversely, the three aforementioned theories have predictive power that can provide a basis to develop an intervention. However, with limited research within substance misuse, OST and food-related behavioural patterns, it is difficult to apply the aforementioned theories to understand what is virtually unknown. To facilitate the necessary understanding, it is imperative to distinguish a comprehensive structure that can also incorporate internal and external influences.

3.3 Emergence of interdisciplinary theoretical models to food-related behaviour

Food-related behaviours “play an important role in symbolic, economic and social aspects of life by expressing preferences, identities and cultural meanings” as stated by Sobal et al. (2006, p. 1). Research of food habits via a multitude of approaches permit researchers to further understand the social, cultural and psychological underpinnings of eating behaviour of individuals and/or groups.

Kurt Lewin attempted to understand food habits, social change and group dynamics through the use of cultural anthropological methods with quantitative methods in psychology. Lewin (1943) proposed a channel theory to explain the movement of food and where the psychological and non-psychological factors intersect. In Channel Theory (CT), widely known as the Gatekeeping Model (GM), food moves through various channels to reach the table in a household. The fundamental areas in channel theory are: a) the various channels, b) who is controlling the channels, c) the forces that govern the channels and d) the movement of food in channels. Supermarkets are an example of one of the channels to obtain food. Individuals choose and buy food, take it home and prepare it for the household. Food can also be obtained from other channels - their own gardens, local shops, restaurants or takeaways.

The key individual who decides which channels to utilise and control is known as the gatekeeper. Lewin's example of a gatekeeper is the housewife or the maid or cook. The individual nature of the gatekeepers will influence their motivations to choose one channel over another. However, Lewin also states that the “physical availability [of food] is not the only factor which determines availability of food to the individual. One of the determining factors is cultural availability” (Lewin, 1943, p. 41). Cultural availability is the familiarity and acceptance of the food item as edible and useful, which is dependent on cultural upbringing and social interaction with other individuals in the group.

The number of channels per family is also particular to one household or group; how gatekeepers utilise their food availability and food acceptance will largely determine how many channels are sourced. Forces within channels can cause barriers to movement such as food pricing, or spending and budgeting. Furthermore, food may also be distinct to family members and meal times. For example, children may eat food that is specifically aimed at them for reasons such as age, their ability to chew, and their nutritional demands. During meal times, food items eaten at breakfast may vary from lunch or dinner foods. Food items also, depending on their state, can move slowly or quickly through various channels. Fresh foods may move through channels quickly and are consumed within hours or a day. Dry and preserved foods may become static, in one position for days or months while in storage for a later use.

The approach Lewin proposed in his study of food habits could also be utilised to analyse the research objectives of the current study. However, Lewin's model focuses primarily on group dynamics. An example of this is a study in Australia that investigated gatekeeper influence on food acquisition and preparation in family households (Reid et al., 2009). For the current target group, individuals may be their own gatekeepers and the managers of their food consumption which was not considered by Lewin. Another theoretical framework that focuses on individuals, society and culture may provide an explanation on a micro-level.

3.3.1 Social constructs as determinants to research food-related behaviour

Influential theorists such as Pierre Bourdieu, Roland Barthes and Mary Douglas were social scientists who revolutionised research regarding food, society and culture by combining fields from psychology, anthropology or philosophy and applying this to food consumption and food preferences.

Food has a social significance that may be linked to social class practices and social class reproduction. Pierre Bourdieu rejected the notion that 'taste' was embedded in an innate response to an individualistic choice (Bourdieu, 2013). He referred to the self as the 'habitus'. Habitus is the concept of how the self engages in the social world through the lived experience.

Habitus can be formed through social constructs that individuals develop through different conditions, altering the manifestation of dispositions to develop individual thinking and human agency. Bourdieu posits that structural and institutional properties of society that influence human agency can be determined by the types of capital individuals have accumulated. The types of capital, as proposed by Bourdieu, are composed of four major forms: social, economic, cultural and symbolic capital (Bourdieu, 2011).

Bourdieu categorised cultural capital into three forms: the embodied, the objectified and the institutionalised state. The embodied state represents the predispositions of the individual's thinking and decision making through incorporation and assimilation of [cultural] properties. The acquisition of cultural capital may differ according to period, society and social class. The objectified state is linked to cultural goods that provide a connection to new information to develop critiques or theories from external sources. To acquire these goods requires economic capital to purchase them, but embodied cultural capital to utilise them. The institutionalised state is the objectified form of cultural capital, by producing an end product such as gaining an academic qualification, which incorporates the acquisition of knowledge through objectified cultural capital that becomes part of the embodied state.

Social capital is composed of an individual's social network of relationships through mutual acquaintances or a membership into a group. "The network of relationships is the product of investment strategies, individual or collective, consciously or unconsciously aimed at establishing or reproducing social relationships that are directly usable in the short or long term" (Bourdieu, 2011, pg. 89). Economic capital is the main source to acquire the various types of capital by purchasing goods and services. It is the base for the other types of capital by providing immediate acquisition and access. Symbolic capital is the recognition gained from the three other forms of capital into a form of legitimation of the social world (Bourdieu, 2011, Bourdieu, 1989). Credentials are legitimate and recognised forms of symbolic capital that represent the totality and integration of the three other forms of capital.

Bourdieu refers to distinction of taste as a reflection of class, particularly of the bourgeoisie from other social classes. Class position is an equivalent of taste and body by the value embedded in

the objects of consumption. As Bourdieu (1984, pg. 6) stated, "Taste classifies, and it classifies the classifier." He distinguishes between the taste of necessity as economical or filling foods, while the taste of luxury or liberty is the manner of consumption that extracts itself from a purely functional mechanism. Economic and social conditions contribute to the social space which is connected to the formation of habitus and social class.

The concepts of habitus and capital as contributors to distinction of taste are factors to consider. However, the concept of class and distinguishing class may be difficult to apply to the study population. While the group may have shared characteristics that contribute to vulnerability to health, this does not necessarily translate to the formation of their tastes. Specific variables may contribute to drug taking and drug addiction, but the individuals themselves may have come from various family backgrounds and possess varying level of skills and knowledge of food. Unless the study is focused specifically on certain backgrounds and social classes to make that distinction, it would be difficult to incorporate Bourdieu's theory to the current study. Taste preference and social class is a topic that is beyond the scope of the current study.

Decoding information and meaning in food through a psycho-sociological perspective was proposed by Roland Barthes. The concepts of denotation and connotation are attached to objects and practices (Barthes, 1997). Denotation is the scientific, objective description of an object or practice that is associated with no further meaning. Connotation however, is the attachment of social, cultural and political beliefs or values to objects and practice, to provide a meaning beyond the value-free description. Cultural objects such as a house or a bed are denoted as such, but their function and their attachment to differing values define their significance to society.

Barthes' example of food advertising provides an explanation of his theory through three groups of themes. Firstly, food has a function that allows individuals to take part in the national past by indulging in food cooked using experiences gained from past generations (e.g. food techniques, cooking, and preparation). Secondly, it is possible for foods to have connotated links associated with them to create an image. Individuals may have positive or negative feelings attached to certain foods, such as superiority or inferiority. Foods are then consumed and avoided according to the status that is attached to them. Thirdly, individual awareness of health and its connection

to food can allow the body to cope with every day activities. For instance, a beverage such as coffee is connected to alertness or ridding oneself of fatigue, or the ability to cope with the day.

The thematic explanation Barthes' proposed is not without limitations. The themes are broadly structured and act as a type of classification scheme than a theoretical framework. He treats cultures as whole entities to compare, for example mentioning the comparison of French culture to American culture. There is an underlying assumption that there is no individual variation and no change over time. Conversely, Barthes' theory could be useful to understand some of the current images that are associated with food items such as the awareness of branding versus shop brands, or delineated images of various food-selling shops and the images that are perceived.

Food rituals are also embedded within culture and shared among individuals in society. Mary Douglas, in particular, analysed meal compositions, number of courses and localised food systems in British households (Douglas and Nicod, 1974, Douglas, 1972). Social events were embedded within the chain of daily and weekly eating events such as snacks, type of meals, the chinaware and cutlery used and the participants. Social boundaries that form hierarchies and inclusivity and exclusivity in the household structure created localised food systems according to the type of activities in the meal system. For example, Douglas used concepts such as ceremony to define the importance of meals by the use and type of plates and utensils, the type of meal by the exclusive uses of potatoes and cereals, and the number of courses in any one meal.

Douglas' approach to the meal system is particularly interesting for the social and cultural aspects she proposed, by understanding the social boundaries that lie within and without the household structure. The complex meaning that is embedded in a social event such as eating also expresses broader ties to the order of social structure. There is also some understanding of the social-economic structure of the household and temporal structure around eating in correspondence to the hierarchy of family members. The micro-level research and analysis of individuals, foods and the household is also an appealing approach because the perspective allows for a bottom-up or micro-level analysis. Douglas' framework is a valid one to understand the social and cultural ties to food-related behaviour; however it could not address some of the

biological and nutritional aspects of the current research study objectives, including “What are the influences between patterns of illicit and prescribed drug use and nutrient intake?” (e.g. effects of drugs on the system that may inhibit nutrient intake). The approach also does not consider the fluidity of change over time.

3.4 Comprehensive food choice and food behaviour models

In recent decades, comprehensive theoretical models that considered a micro- to macro- level analysis began to gain recognition, particularly in health promotion and nutrition education. Four models in particular focus on food, food preference, the individual and the environment (Devine, 2005, Bronfenbrenner, 2004, Connors et al., 2001, Furst et al., 2000).

The life course perspective is an integrated framework that was applied to food-related behaviour (Sydner et al., 2007, Sobal et al., 2006, Devine, 2005, Devine et al., 1998). Food choice is a trajectory that is shaped throughout the life course, with influences from micro-contexts (e.g. family, friends, school) and macro-contexts (e.g. society culture, economy) over time. The temporal, social and historical frameworks are the contexts in which to investigate the food choice processes.

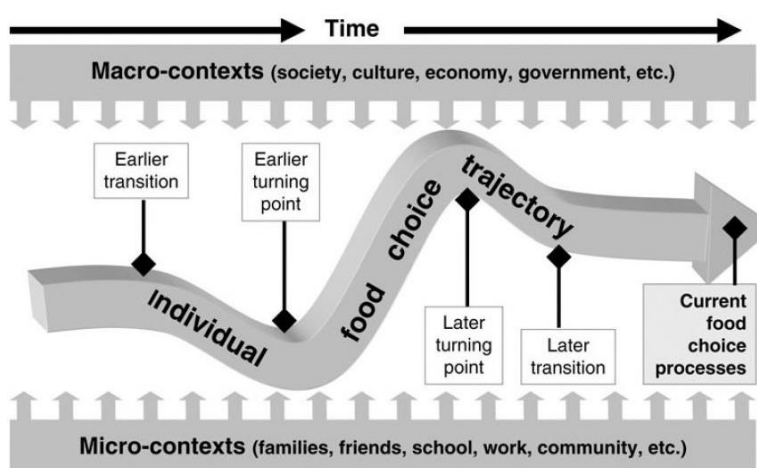


Figure 5 A conceptual model of the life course perspective of food choice (Sobal et al., 2006), adapted from (Devine et al., 1998)

In accordance with Figure 5, food choice trajectories develop and transition throughout the life course. The social aspect focuses on areas such as social class, race, and ethnicity (Devine, 2005). The historical framework investigates the trends in society, culture, economy, and government at the time of the transition, placing transitions into greater context. The availability of food choices that could change the food choice trajectory change over time, developing cohorts of individuals whose food choices depend upon their generation.

The life course perspective is a cumulative theoretical framework that can provide a way to understand food choice in broader terms. Understanding the turning points and transitions in the life course of an individual or a group through the context of time, society and history provides an extensive portrait of food behaviour and food availability using numerous variables. As a theoretical framework for an extended project with a long follow-up, the life course perspective would be an ideal framework to utilise.

For the purposes of the current project, the life course perspective is a theoretical framework that may be able to contextualise the results of the study. The mixture of methods in the theoretical model, those being social and environmental factors on both micro-/macro-levels, map well to the research in the current project. However, people receiving OST have numerous transitions in short bursts of time, and some have psychological traumas that cause barriers to earlier memories (Moen and Lennart, 2003, Villagómez et al., 1995, Hien and Levin, 1994). Access to traumatic memories and/or hazy memories during periods of heavy drug consumption is difficult to obtain. It would therefore prove problematic to retrieve all of the necessary information to utilise the theory. Furthermore, in contrast to the long-term longitudinal studies used for this model, an alternative theory that can be used for a shorter period of time may be better suited to this study and the target group.

Food choice and food-related behaviour were conceptualised in a model by Furst et al. (2000) to understand how individuals classify foods (Figure 6). Food classifications are determined by personal, social, cultural and all other possible classifications. These classifications are referred to as schemas. Schemas are the collections of knowledge from past experiences that guide

behaviour (Furst et al., 2000). As individuals live and grow, these schemas are shaped and changed.

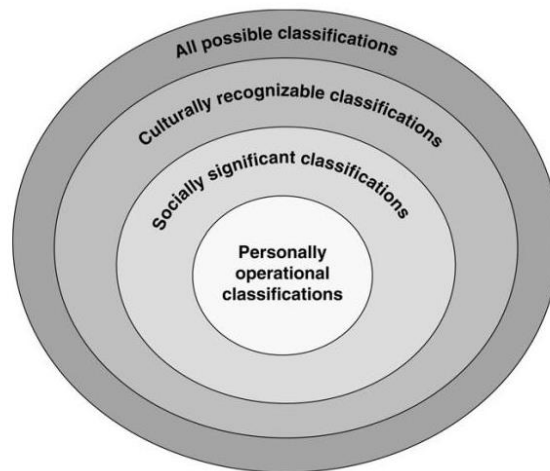


Figure 6 Food classifications (Furst et al., 2000)

The analysis of food classifications would be insightful to illuminate how schemas influence and direct food choice through individuals and their interaction with others in the environment (Blake et al., 2007). The schema theory that drives the food classification model would be useful to analyse qualitative data and can also be applied to individual and group tendencies. Food classifications could be used to complement the current research project's primary aim to explore dietary patterns by identifying semantic connections to food preferences through qualitative data analyses, but could not address the quantitative objectives of the current study such as nutrient intake or body composition.

The personal food system (Figure 7) is a theoretical framework that can be applied to understand individuals' mental processes to develop their food choice (Connors et al., 2001). Individuals have their own food choice values to develop their food preferences. In the personal food system model, the boundaries and trade-offs to areas such as health, cost, taste, relationships and convenience can alter their food selections. Food choice values are seen as fluid and ever-changing over the life course and in situations that may change daily.

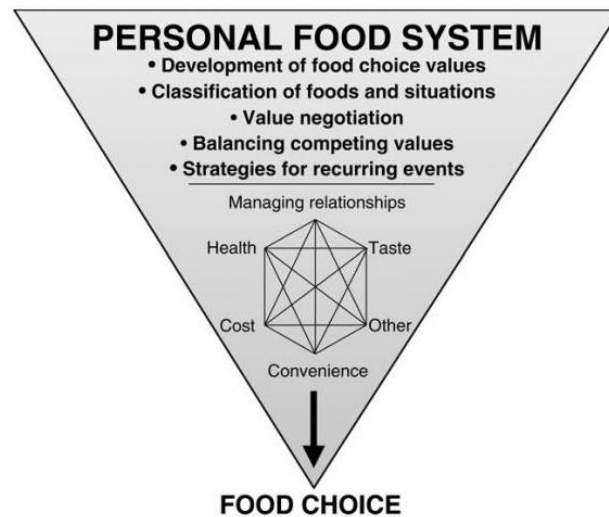


Figure 7 The personal food system (Sobal et al., 2006) adapted from (Connors et al., 2001)

The personal food system is particularly useful to understand how individuals come to a decision about their food selections. Previous studies have reported themes such as cost and convenience of foods in eating behaviours of people who use drugs in different treatment settings (Neale et al., 2012). The personal food system could also be applied to people receiving OST. However, vulnerable populations may need an adaptable, flexible model that can include population-specific factors that would likely fall into the 'other' category of this model. A model that provides the flexibility to address all aspects of a specific population could better provide an in-depth understanding of all of the potential factors that may prove important in the analyses.

3.4.1 Bronfenbrenner's Ecological Systems Theory (EST)

One of the most widely adapted and utilised models for health promotion, disease prevention, policy research and nutrition education/intervention is Bronfenbrenner's ecological systems theory (EST) or social-ecological model (SEM) (Espelage and Swearer, 2009, Visser, 2007, Naar-King et al., 2006). EST is a theoretical framework that focuses on human behaviour, human development and the bi-directional influences of nested environmental systems (Bronfenbrenner, 2004, Bronfenbrenner, 1979). EST was originally used to understand human development in the

case of young children but was also adapted for use in health promotion behaviours and interventions (Egger and Swinburn, 1997, Stokols, 1996, McLeroy et al., 1988). For example, the Violence Prevention Alliance, a part of the World Health Organisation (WHO), adapted the model to examine the risk factors in interpersonal violence (Violence Prevention Alliance, 2013). The ecological model was also transformed into a policy framework guide to inform behaviour change in schools (Townsend and Foster, 2011). The model was also critically reviewed against other major behaviour change models (Richard et al., 2011, Baranowski et al., 2003).

According to the ecological perspective, individuals are influenced by the social network matrix in their ecological systems of influence through person-context relational processes. Changes to these processes can also occur throughout the life course. The model builds upon nested systems of bi-lateral influence in human behaviour: the microsystem (intrapersonal and interpersonal levels), the mesosystem (organizational or institutional levels), the exosystem (community level) and macrosystem (national and international levels) and an individual's interaction within and among the systems over time (chronosystem). Figure 8 includes a visual framework of EST in the current study.

The microsystem consists of the intrapersonal and interpersonal levels of influence. With regard to dietary behaviour, intrapersonal factors can include taste preferences, eating habits, nutritional knowledge, cooking knowledge and skills. Biological and genetic factors can also influence dietary behaviour by the creation of advantages or barriers to eating. For example, lactose or gluten intolerance can change an individual's eating behaviour. Illness or physical injury can limit mobility and the ability to cook and/or eat.

The interpersonal levels of influence in the microsystem pertain to the experiences of individuals and how they perceive their environment. External influences affect psychological growth and give meaning to the individuals experiencing them. The dining area of a home, as objectively noted, is a place primarily used for food consumption. There may be a table with surrounding chairs and individuals may use the table, glassware, and utensils to consume food. The dining area may have memories and experiences tied to them that individuals experienced in the past

or present. They may remember family gatherings, celebrations or sad events. The symbolic significance of the dining area is more than a place to simply consume food.

The organizational or institutional levels of influence in the mesosystem largely incorporate the active participation of the individuals in various settings. Settings such as the home, school, workplace, church, community organisations and social clubs may be included. Relationships and interaction with family members, close friends, peers or co-workers can change dietary behaviour through social traditions in the home, role expectations or eating practices. An example would be eating together in a school cafeteria or a work canteen. Individuals may actively interact with others, eating and socialising with specific groups of people during lunch or dinner. They may learn different eating practices than the social traditions in the home.

The exosystem is the level of influence where individuals do not actively participate, but can be affected. The location of a supermarket is not determined by the individuals themselves, but its location can be beneficial or disadvantageous. If the supermarket is a distance away and individuals are unable to reach the location without using transport or a car, they may choose to buy foods that are frozen or tinned for consumption over a more extended period of time. Food accessibility becomes limited and therefore, dietary behaviour change may occur.

Government, policy, media and culture are examples of the levels of influence found in the macrosystem. Belief systems or ideology as a whole may differ from other countries or cultures. Media influences both nationally and internationally can affect the lower order systems. An example of macrosystem influence in dietary behaviour is the regional, sub-cultural and cultural variations of dietary behaviour in the UK. Change4Life (<http://www.nhs.uk/change4life/Pages/change-for-life.aspx>) is a government instigated organisation that through a social movement campaign provides another method of spreading awareness of healthy behaviours such as food choices and physical activities among individuals and families in the UK (Change4Life, 2013).

The inclusion of the chronosystem in the ecological systems theory incorporates a dynamic in the theoretical model that was not considered in previous comprehensive models. Originally, the

dimension of time was only applied to individuals and their characteristics at any one point. The environment was considered a fixed constant and unchanging as research only observed changes at a single point in time. The chronosystem as proposed by Bronfenbrenner (2004), considers critical events that occur for an individual throughout the life course and the building of varying experiences. It is suggested that these events may alter the dynamic between the person and the environment, causing a developmental change to occur and adding to life transitions in the life course. For example, upon receiving employment and a salary, food accessibility and security may be higher than when the individual was in school or university. Job loss may also affect food security and cause difficulty to access food, causing a barrier through financial hardship.

In the current study, the application of a social-ecological approach is appropriate to understand dietary behaviour, particularly in an area that lacks existing research. The model covers an array of factors, from attitudes or perceived myths of food to broader societal factors such as governmental and policy changes and their influences. The chronosystem also enables an exploration of the past experiences of the individuals and their ties to the present. Childhood memories of food and the household may provide insight to identify food behaviour transitions of the individuals, and identify any ties to food movements in the eras during which they have lived.

The flexibility and adaptability of the ecological framework may make it a valuable tool for exploring how eating behaviours among people receiving OST are shaped and changed. People receiving OST have complex, interrelated factors that must be explicated to understand how the processes and conditions influence both the individual and the surrounding environment. The nested systems of EST provide a flexible framework to contextualise these factors. Furthermore, any rapid changes over time in these factors can also be captured in this model (by reference to the chronosystem). The ecological perspective can also be utilised to discover determinants for further research and modified to a policy framework guide if necessary.

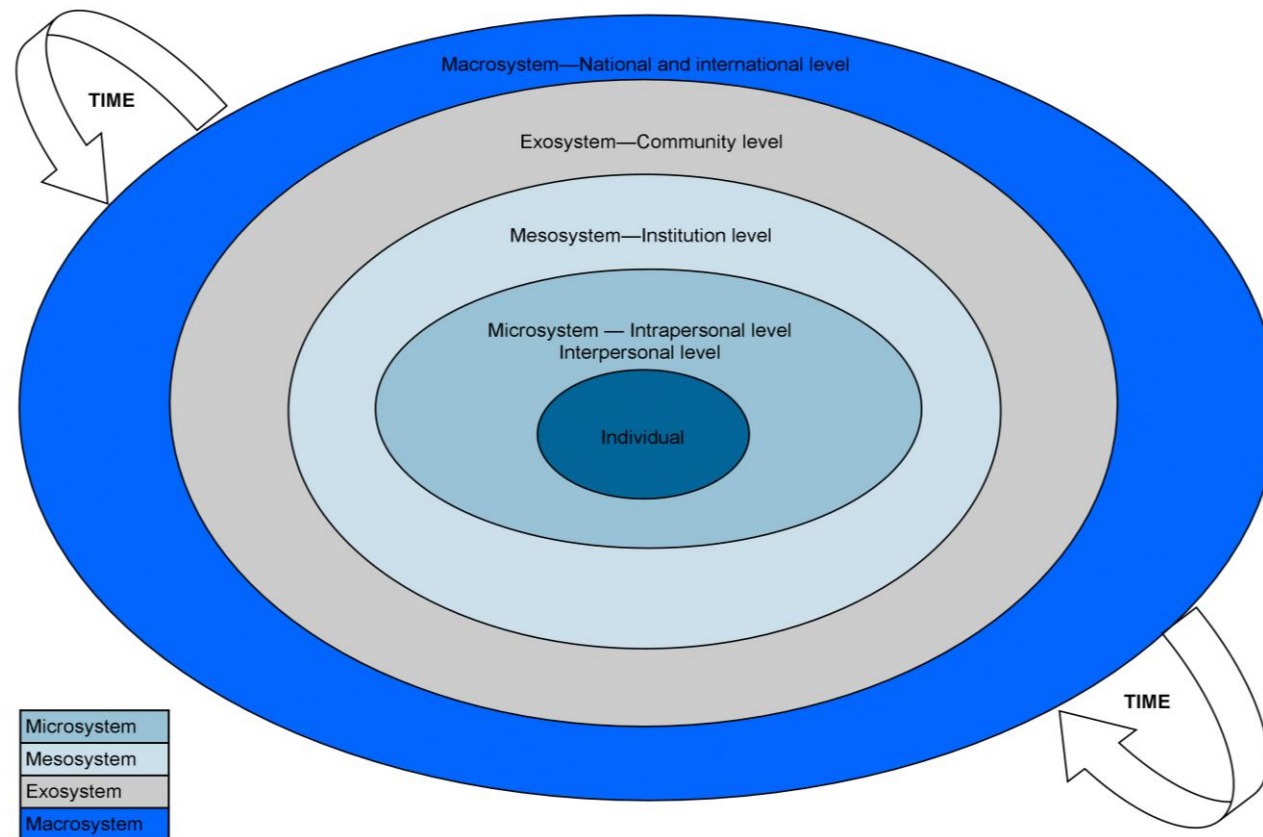


Figure 8 Bronfenbrenner's EST model, adapted from (Bronfenbrenner, 2004)

3.5 Theoretical concepts and models guiding the research

The numerous frameworks and models contained in this theoretical overview all have merits for application to the current study's research. Previous dietary behaviour studies focused on interventions to determine the effectiveness of behaviour change in individuals' diets. Many of the theoretical approaches consider quantitative and qualitative methods and social-cultural determinants over the life course. However, the current study's aim is to explore diet and nutrition in a sample population that has limited previous research in the UK. A theoretical model that broadly allows for numerous social-cultural factors, physiological factors and psychological factors (through self-perceptions and experiences) would provide information as a basis of understanding. From this base, future research and potential implications can be investigated on a micro- level to pinpoint determinants that require further exploration. Bronfenbrenner's EST model is comprehensive and appropriate for a mixed methods approach in its adaptability and flexibility. The model can be utilised for an exploratory study but also altered for use as a policy framework guide or behaviour change model. There are a plethora of routes to utilise this theory to inform policy, practice and research implications in the current study.

Chapter 4 Methods

4.1 Introduction

This chapter provides an overview of the research by detailing the following: the aims and objectives, the research design, the rationale for the design, sample size, ethical approval and consideration, recruitment, research setting, fieldwork timeline, research methods, data processing and coding and overview of the methodology.

4.2 Aims and objectives

The aim of the current study was to improve our understanding of the dietary behaviours of people receiving opioid substitution treatment (OST) in the United Kingdom (UK). It had seven objectives to examine the relationship between people receiving OST and their dietary behaviours, namely:

1. To explore food choices, food consumption patterns and processes of food acquisition
2. To explore nutrient intake and body composition
3. To investigate influences between patterns of illicit and/or prescribed drug use, and food consumption patterns
4. To investigate influences between patterns of illicit and/or prescribed drug use, and nutrient intake
5. To investigate how perceptions of food and diet affect food choices and food consumption patterns
6. To investigate how physical, social and/or environmental factors affect food acquisition and consumption patterns
7. To identify strategies for supporting dietary and nutritional needs

4.3 Research design

The current study used a longitudinal convergent parallel mixed methods approach employing both quantitative and qualitative research tools concurrently (Creswell, 2013). Findings from each database were integrated to complement each other in the results. Quantitative research tools were used to collect information about socio-demographic background, prescription and illicit drug use, general physical and mental health functioning, body composition and nutrient intake. The study also incorporated qualitative methods using semi-structured face-to-face interviews to understand participants' experiences of food consumption and acquisition from childhood to adulthood. Participants were followed-up four months after baseline data collection. The same quantitative measures were collected at the second time point. Semi-structured face-to-face interviews at follow-up focused on participants' experiences during the four months between the baseline and follow-up stages.

4.3.1 Rationale for the design

Previous literature from various fields used diverse methods to approach food consumption patterns in people who use/inject opioids and people receiving OST. Studies such as (Islam et al., 2002), employed quantitative approaches using dietary intake data and biomarkers to assess nutritional status, however as they were cross-sectional, they could only explain one point in time. A study conducted by Kolarzyk et al. (2005a) followed up people receiving OST at three examinations over four years to assess their nutrient intake. Other studies such as (Nolan and Scagnelli, 2007), researched food preferences and found people receiving OST were eating more meals a day more frequently than their general population counterparts. While the studies could provide a description of dietary and nutritional status, they lacked an explanation of the social phenomena and the ecological factors that played upon food choices that in turn, affected food consumption. Research by (Neale et al., 2012) provided information about the lived experience of food and eating patterns of individuals, however the physical health status and nutritional status to understand overweight and obesity risks or non-communicable disease (NCDs) risks could not be determined.

By combining approaches from the quantitative and qualitative arenas, a fuller spectrum of research areas can be identified and a deeper understanding of the participant sample can be obtained. Due to the multiple approaches to research food consumption patterns in previous studies, a multi-component theoretical approach was considered. It was also considered to be important to find an approach that allowed an examination of individual factors that were content specific, but could be placed in a broader context (i.e. health and nutrition policies, health care) (Visser, 2007). While the Social-Ecological Model (SEM) was adapted and applied for use in health promotion and interventions models (Sallis et al., 2008, Gregson et al., 2001, Stokols, 1996), the original Ecological Systems Theory (EST) provides a systematic approach to explore all of the potential influences in a way that could be adapted to guide further research (Bronfenbrenner, 2004, Bronfenbrenner, 1979). The main philosophical construct of the model is that “no human lives in a vacuum – individuals are shaped by the world surrounding them” (Brennan et al., 2014, p. 225).

In the current study, the aim could not be achieved without mixed methods. Simultaneous methodological triangulation was used to answer the research objectives (Morse, 1991). The first objective can be addressed using multiple methods to explore food consumption patterns and nutrient intake of people receiving OST, namely:

1. To explore food choices, food consumption patterns and processes of food acquisition

Quantitative methods were used to determine the central tendency in the sample population. It also uncovered outliers in the data. Body composition measures and five days of dietary intake from 24-hour dietary recall interviews (24HR) were recorded at a baseline stage and a four month follow-up stage. These two research tools provided an understanding of the participant's body composition, dietary and nutrient intake. Surveys provided further understanding of participant's socio-demographic background and health related quality of life. Dietary intake and the body composition measures were compared to the general population to determine how the target group differed from population norms.

The quantitative methods provided one method to understand human behaviour that can address three objectives, namely:

2. To explore nutrient intake and body composition
3. To investigate influences between patterns of illicit and/or prescribed drug use, and food consumption patterns
4. To investigate influences between patterns of illicit and/or prescribed drug use, and nutrient intake

Using solely quantitative methods to address the latter two objectives may be difficult, namely:

5. To investigate how perceptions of food and diet affect food choices and food consumption patterns
6. To investigate how physical, social and/or environmental factors affect food acquisition and consumption patterns

In order to understand the social phenomena that link to the physical status and functioning of the participants, environmental influences must also be considered. For example, food choice, food neophobia and fussy eating can occur during early childhood, resulting in lower dietary variety, particularly vegetables that may affect school age children (Skinner et al., 2002, Carruth et al., 1998). Furthermore, early food consumption patterns experienced as a child may persist into early adult life (Nicklaus et al., 2005). Qualitative methods including interviews can explore each individual's beliefs, circumstances, relationships, and influences that moulded their food consumption patterns and food choices through the lifespan, in the case of the current study – from childhood up to the time of interview. Mixed methods used in the current study provided a systematic integration to obtain a deeper understanding of a phenomenon and the lived experience of individuals, particularly an area that has limited previous research (Creswell, 2013, Castro et al., 2010, Johnson et al., 2007, Chen, 1997a).

4.3.2 Quantitative power calculation and sample size

Sample size was calculated according to a two-tailed one sample t-test of the mean difference in energy intake comparing the population sample and the general population for a medium effect size ($d = 0.5$) and a significance alpha of .05. To achieve a power of .80, the total sample size was estimated to be at least 34 participants. Four pilot participants gave direct feedback after undergoing the components of the study. After receiving their feedback, it was established by the researcher that retaining participants for the full duration of their participation in the study may have proved difficult due to the transient nature of people who use opioids. It was unclear whether people receiving OST would be more or less transient. An attainable goal for the study was to follow 20 participants through to follow-up, including any unforeseen reasons for non-participation such as: eligible candidates who did not consent, failure to honour appointments, changing of appointments, loss of contact, etc. Although a sample of this size would not be sufficient to guarantee statistically significant results for all quantitative measures, large differences were likely to be detected and other quantitative results could be used to direct further study.

4.3.3 Ethical approval

Ethical approval for the study was granted by the National Research Ethics Service Committee (NRES) in February 2012 (NRES: 11/SC/0546 see Appendix A). The consent forms, information sheets and questionnaires were written in a clear, non-technical language that was accessible to a non-expert audience. The format of the information sheets and consent forms was made using a practical layout for clarity with clear sub-headings and an appropriately sized, legible font. From previous studies (Neale et al., 2008, McLaughlin et al., 2000), low literacy levels were expected and measures were taken for the eventuality that the participants needed extra help understanding the information sheet and consent forms. When participants requested assistance with reading, the researcher read over all of the forms with the participants and confirmed with the participants that the information was understood.

4.3.4 Consenting processes

Participants were given a full explanation of the study and given an information sheet to take home. When participants were ready to consent, consent forms (Appendix B) were explained fully and two copies were signed. Participants retained one copy of the consent form for their records. Participants were fully informed they could drop out of the study at any time.

During body composition measures, participants confirmed beforehand the presence of/absence of a chaperone in the room with the researcher. A chaperone form (Appendix C) was read over with each participant and they confirmed their preference and signed the form. The researcher countersigned the form and gave a copy to the participants for their records.

4.3.5 Compensation

Participants were given £5 supermarket vouchers for each day (ten days total) of their participation. Participants who dropped out of the study were compensated only for the days they participated.

4.4 Recruitment

4.4.1 Participant inclusion and exclusion criteria

Participants had to be age 18 years and over, speak English and be receiving a prescription for methadone or buprenorphine for OST at the time of the study. People who were under 18 years of age and/or not receiving a prescription for OST were excluded from the study.

4.4.2 Research setting

Pharmacies suitable to the current study were found through the Shared Care programme. General practitioners (GPs) and pharmacies can voluntarily participate in the Shared Care programme through the Drug Misuse Local Enhanced Service (LES) which provides primary and social care services to people who use drugs. Pharmacies participating in the programme dispense prescriptions for OST and can also provide harm minimisation services. A directory of participating pharmacies was found through the webpages of the Drug and Alcohol Action Team (DAAT) at the time of data collection. DAATs are county-wide commissioned drug and alcohol treatment and support services that provide alcohol and substance use information.

In early 2012, invitation letters (Appendix D) were sent to pharmacies that were a part of the Shared Care programme in Oxfordshire, England. Approximately one week after letters were posted, the pharmacies were contacted over the phone to assess interest and confirm cooperation in the study. Pharmacies taking part in the study were visited and meetings with pharmacy managers took place to confirm the confidentiality and sensitive handling of the information to be collected while on the premises. Each pharmacist was informed of the study and given information sheets (Appendix E) to hand out to potential participants. Pharmacies that had a consultation room were asked if the space could be utilised for body composition measurements. In the event the pharmacy did not have a consultation room, the participants were taken by public or private transportation (i.e. local buses, taxis, cars) to a designated room on the university campus.

4.5 Fieldwork timeline

4.5.1 Pilot study and testing

Pilot testing began in February 2012 for approximately one month. The follow-up stage of pilot testing was conducted in June 2012. Four pilot participants were recruited for trial testing of five

days of data collection. Participants commented on the length of the study and the potential respondent burden to complete all five days. Two of the pilot participants commented on the possible difficulty to maintain commitment from participants who were in the early stages of OST or topping up their OST prescriptions by using illicit drugs as their priorities may still be in transition and they are adjusting to their lives. One pilot participant, who suffered from Seasonal Affective Disorder (SAD) and depression, thought mental health issues and emotional changes could pose an issue to participation, particularly if the follow-up was during a period when a participant was experiencing issues of this nature. The third pilot participant, who was released from prison a week before his recruitment into the study, commented on potential transient issues with participants such as moving shelters or hostels, obtaining housing accommodation, entering a treatment facility and/or serving prison sentences. The fourth pilot participant drank excessive amounts of alcohol during all of the data collection days. Changes to the interview schedule included adding dental health questions and digestive health issues that specifically asked about abdominal issues. Modifications were made to the organisation of the five day data collection and only two research tools were implemented on any one day.

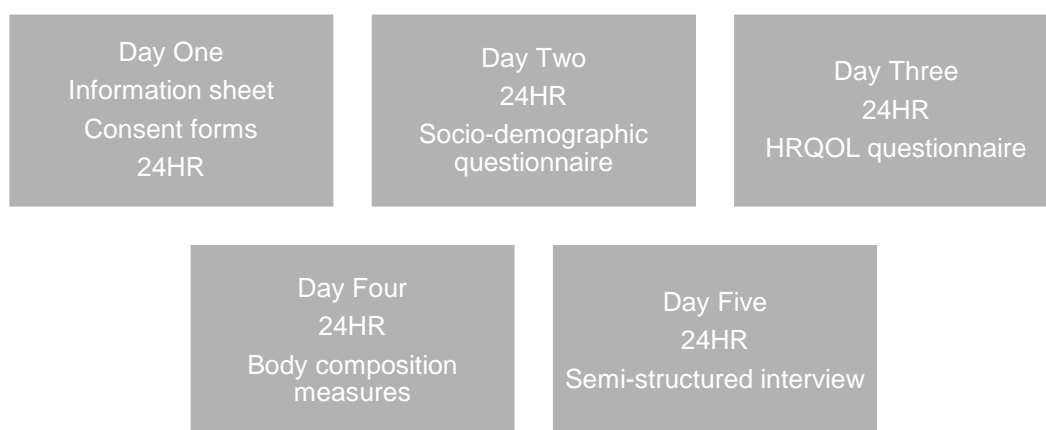
At follow-up, the first pilot participant who suffered from SAD and depression exhibited positive changes in his mood. He was more active and willing to participate in the second stage of the study due to the warming temperatures and longer exposure to the sunshine. The second pilot participant experienced manic symptoms as a result of bi-polar disorder. She was easily irritated, spoke excitedly and had a short attention span. She exhibited these symptoms to a greater degree particularly during longer sessions such as body composition measurements and the interview. The third pilot participant reported for a prison sentence during the follow-up stage and was unavailable. The fourth pilot participant drank excessive amounts of alcohol during all of the data collection days. All of the mentioned issues were monitored during the duration of the study.

4.5.2 Main study

The main study commenced in March 2012 and finished in May 2013. In anticipation of the restricted sample size, multiple methods were used to capture as much data as possible. Both

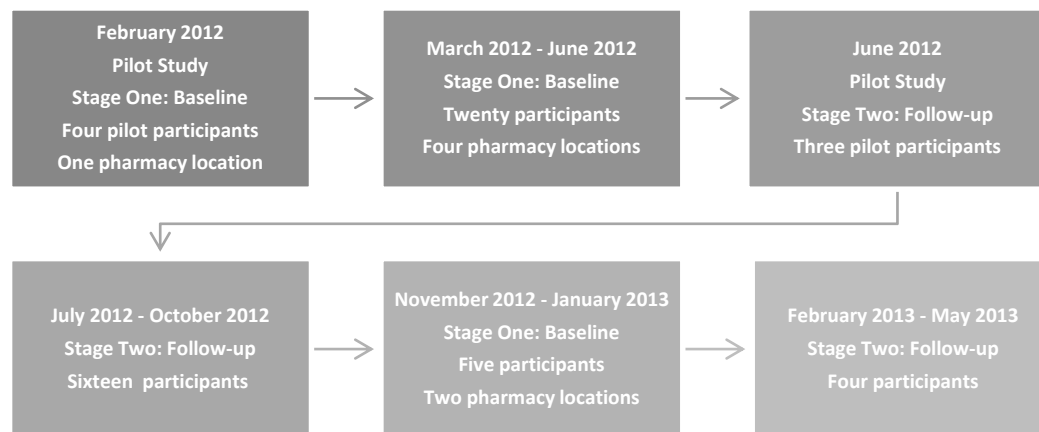
quantitative data and qualitative data were collected at the same time from the same set of participants (convergent and parallel data collection). Over the five days, tasks were broken up to reduce respondent burden. With each 24HR, the researcher also implemented one other research tool (Figure 9). At follow-up, the same five day method was used to collect data.

Figure 9 Data collection for stages one and two of fieldwork



The researcher recruited one group of 28 participants from March 2012 – June 2012. However, eight participants withdrew or were dropped from the study due to unavailability or ineligibility. Data from the eight participants were incomplete (one or two days of data were collected) and were not used in the current study. Twenty participants fully completed Stage One: Baseline (Figure 10). Sixteen participants completed Stage Two: Follow-up. A second group of five participants from two pharmacies was recruited. Four participants completed Stage Two: Follow-up. Data collection was more complicated with the group due to participants with young children; however, scheduling proceeded without issues. At follow-up, scheduling appointments was difficult as follow-ups coincided with children's school holidays. Re-scheduling occurred after school was in session and when participants were available.

Figure 10 Participant recruitment flow chart



The researcher limited data collection to the daylight hours of the pharmacy's opening times when participants were due to collect their OST prescription. Data collection was limited to two to three concurrent participants during one five day period. Though appointments were made, waiting times to meet with participants ranged from one to three hours, to five to six hours. Participants differed in their adherence to the meeting schedule, from those who were able to complete their participation over five days to those whose data collection period could last two to three weeks due to multiple re-scheduling requests or skipped appointments. Occasions occurred when participants picked up their prescriptions at the same time; appointments were re-scheduled with one party. Appointments were also re-scheduled with participants who were unable to pick up their prescriptions or picked up their prescriptions during late night hours.

The main study findings are separated into four chapters in the thesis. Chapter Five incorporates data results from socio-demographic questionnaires and HRQOL questionnaires. Quantitative data results (Chapter Six) from 24HR (Thompson and Byers, 1994) and anthropometric measures are utilised to report dietary intake, nutrient intake and body composition. Food consumption patterns and dietary behaviour from childhood to OST are investigated using the qualitative data results from qualitative interviews. Qualitative interview analyses are reported in Chapter Seven and Chapter Eight. Chapter Seven explores childhood food consumption and eating behaviours up to leaving the family home. Chapter Eight explores food consumption patterns of participants

during periods of heavy drug use and when receiving OST. The baseline stages and follow-up stages are also explored in Chapter Eight.

4.6 Research tools and methods

4.6.1 Socio-demographic and drug use history questionnaire

Each participant completed a researcher-designed socio-demographic and drug use questionnaire which also included a section of the Maudsley Addiction Profile (MAP) (Appendix F) (Marsden et al., 1998). Some modifications were made to this instrument for people receiving OST. The socio-demographic questionnaire asked about age, ethnicity, employment, accommodation, partner/children and prescribed medications. The MAP section of the socio-demographic and drug use questionnaire incorporated the frequency, quantity and route of administration of non-prescribed, legal and illicit drugs during the previous three days and previous 30 days prior to data collection. Descriptive statistics were used to analyse the socio-demographic data.

4.6.2 Health related quality of life questionnaire (HRQOL)

Participants completed the Short-Form 36 (SF-36) health-related quality of life questionnaire (HRQOL) (Appendix G) (Ware and Sherbourne, 1992). The SF-36 asked about functional health and well-being; it also incorporated questions about physical and mental health functioning.

The SF-36 questionnaire was used to measure eight scales: *Physical Functioning*, *Role Limitations due to Physical Health*, *Pain*, *General Health*, *Energy & Vitality*, *Social Functioning*, *Role Limitations due to Mental Health*, and *Mental Health* (Ware et al., 2000, Ware and Sherbourne, 1992). The internal consistency was measured to determine the reliability of the testing instrument using baseline data from the current study. Assessment of the internal consistency was conducted by running Cronbach's alpha analysis. The acceptable reliability

coefficient is indicated as $\alpha \geq .7$ (Nunnally, 1978). All of the scales had acceptable internal consistency (Table 3).

Table 3 Internal consistency of the SF-36 HRQOL

SF-36 Dimensions	Number of items	Internal Consistency (Cronbach's α)
Physical functioning	10	0.95
Role – physical	4	0.85
Pain	2	0.81
General health	5	0.87
Energy/vitality	4	0.69
Social functioning	2	0.84
Role – mental	3	0.87
Mental health	5	0.83

Scales analyses using a paired samples t-test were also conducted between the follow-up and baseline data of 20 participants who completed both stages of the study. Using boxplot analyses, the scales for *Physical Functioning*, *Social Functioning*, *Role Limitation due to Physical Health*, *Pain*, *General Health*, *Energy & Vitality*, and *Mental Health* had no outliers that were more than 1.5 box lengths from the edge of the box. Shapiro-Wilk's test was used to test the distribution of the scale scores (Table 4). No evidence was found to suggest that these scales were non-normally distributed.

Table 4 Test of normality for seven dimensions of the SF-36 HRQOL

SF-36 Dimensions	Shapiro-Wilk's test of normality
Physical Functioning	$p = .098$
Role – physical	$p = .241$
Pain	$p = .442$
General health	$p = .125$
Energy/vitality	$p = .192$
Social functioning	$p = .434$
Role - mental	$p = .365$

The scale, *Role Limitations due to Mental Health*, was analysed and three outliers were detected in a boxplot analysis and upon inspection, were determined to be extreme. The outlier values were genuinely unusual, not the result of measurement error or data entry error. The scores could not be assumed to be normally distributed. A non-parametric test was considered for use to retain the outliers in the sample. The Wilcoxon signed ranked test compared repeated measurements on a single sample and retained the outliers in the analysis.

The eight scales were used to compare the current study sample with the UK general population data provided by Jenkinson et al. (1999). The difference (DIFF) in the scores was calculated using the equation [DIFF = Mean (UK population) – Mean (current study)]. Due to the difference in sample sizes and the unequal variances in the current sample and the UK general population, Welch's t-test was run to determine if there were differences in the SF-36 health scale scores between the OST recipient group and the UK general population. The results of the analysis included 95% confidence interval and a p value with significance at $p < .05$.

4.6.3 24-hour dietary recall interviews (24HR)

24HR is a research tool that is suitable for participants with limited literacy skills (Thompson and Byers, 1994). 24HR was conducted by personal interview with each participant (Appendix H). Each interview was recorded using pen and paper on a food consumption sheet. Each 24HR incorporated the triple pass method. The triple pass method is a standard procedure to record the respondents' food consumption (Nelson et al., 2007). The first pass is a quick list of foods eaten. The second pass involves the weight and amount of food in detail, the time of the food eaten, any combinations of foods eaten together and any recipes or leftovers. Third, the interviewer reviews the food list with the respondent and probes the respondent about any forgotten foods.

A single 24HR underreports dietary intake and cannot be used to accurately represent an individual's diet (Karvetti and Knuts, 1985). Three 24HR can sufficiently minimise the mean difference between reported and objectively measured energy intakes to more accurately represent an individual's dietary intake (Ma et al., 2009). Due to a potentially low recruitment rate, the number of 24HR was increased to five days for a more accurate estimation of each participant's diet. 24HR during the study incorporated at least one weekend day, such as Sunday, to incorporate any varied food consumption patterns that occurred outside of the work week.

The subjective nature of self-reported dietary intake typically underreports dietary intake and portion sizes. In order to minimise underreporting, participants were able to utilise a photographic atlas with eight portion sizes of commonly consumed British foods. The food atlas had photographs of food on a plate that are commonly consumed by UK adults by using sets of eight A7 size photographs of variable portion sizes on an A4 size page (Nelson et al., 1997). Foods were presented on a plain white full size plate, side plate or bowl with commonly used cutlery on the side. Drinks, tins and cutlery were also arranged in various shapes and sizes. Some foods that could be processed such as cheeses and puddings were presented in multiple formats. Cheese was shown in slices, grated piles and cut into squares. Desserts such as puddings had photographs with and without custard. Portion size weight guidelines were given in the data entry section of the atlas. The corresponding weights were used for dietary intake entry.

4.6.4 Dietary intake

Dietary reference values (DRVs) are recommended nutritional intakes for the UK population. DRVs can be separated into three types: Reference Nutrient Intake (RNI), Estimated Average Requirement (EARs), and Lower Recommended Nutritional Intake (LRNI). EARs are used to calculate total energy expenditure and recommended energy intake required to meet the needs of 50% of the population. LRNIs are the minimum nutrient intakes that meet the needs of 2.5% of the population. RNIs are used for macro-/micro-nutrient intake guidelines and are an estimate of the amount required to meet the needs of 97.5% of the population. In the current study, the RNI is appropriate as it can be applied to the sample population. RNI is used as the recommended reference for all macro-/micro-nutrient intakes.

4.6.5 Anthropometry measures

Anthropometric measurements that assessed body composition included the following: body mass, height, waist and hip circumferences and skinfold thickness measures on four sites of the body (Appendix I). Body mass (BM) (kg) and height (cm) were used to calculate BMI in kg/m^2 and were measured using a digital electronic personal scale (Seca 813) (Seca GmbH, Hamburg, Germany) and a stadiometer (Seca 213) (Seca GmbH, Hamburg, Germany). Both instruments were light and portable for ease of mobility during data collection. The design of the digital weight scale could also accommodate for people with physical disabilities and people with a larger body mass. Waist circumference (WC) and hip circumference (HC) (cm) were measured using a measuring tape for medical professionals (Seca 201) (Seca GmbH, Hamburg, Germany). Skinfold thickness measurements (mm) included four sites on the body: biceps, triceps, the scapular (subscapular) and above the iliac crest (suprailiac) using a Harpenden skinfold calliper (Baty International, West Sussex, UK). The International Society for the Advancement of Kinanthropometry protocol was used for the skinfold measurements (Stewart et al., 2011).

4.6.5.1 Body mass and height

The digital electronic Seca 813 scale was placed on a flat, stable surface. Stabilising legs were attached for added stability on carpeted surfaces. Participants were asked to wear light clothing for their measurements. Any outerwear, headgear and footwear were removed. Each participant was asked to remove any items from their pockets. Two measurements were taken and the mean of the two measurements was recorded. In the event the measurements differed by $> .5$ kg, a third measurement was taken and the median value was used. The electronic scale was checked and calibrated each day using a 1 kg training weight.

Height was measured in an upright standing position. The stadiometer was placed on a stable, flat surface. The spacer was placed against the adjacent wall and adjusted for rod straightness in the vertical position. Participants stood facing away from the stadiometer with their arms hanging at their sides in a comfortable position, their knees fully extended and their feet slightly apart. Participants stood with their shoulder blades, hips and heels in contact with the measuring rod. Participants were asked to raise and lower their head until the orbitale (lower edge of the eye socket) was in the same horizontal plane as the tragon (area above the tragus of the ear) (Norton et al., 1996). The stadiometer headpiece was lowered until it was brought to rest on the crown of the participant's head. Two height measurements were taken to the nearest .1 cm, recording the mean of the two measurements. In the event the two measurements differed by $> .5$ cm, a third measurement was taken and the median value was used.

4.6.5.2 Skinfold measurements

The Harpenden skinfold calliper (Baty International, West Sussex, UK) was used for skinfold measurements (Tanner and Whitehouse, 1955). Skinfolds were measured on the right side of the body for reliability and consistency in results. For the biceps and triceps skinfolds, the acromion process of the scapula (bony point of the shoulder) and olecranon process of the ulna (bony point of the elbow) were measured. The midpoint of both the anterior and posterior sides were marked. For the subscapular skinfold, each participant was asked to lift their arm behind their back. The bottom of the scapula was located and marked horizontally. A site was located

at a 45° angle, 2 cm on the lateral side of the body. For the suprailiac skinfold, a diagonal mark was made at an axillary line 1 cm above the anterior superior iliac crest. Using the thumb and index finger of the left hand, a layer of skin and subcutaneous fat were measured, avoiding any muscle tissue or fascia. Callipers were held in the researcher's right hand and the site was measured two seconds after the calliper pressure was released. Each skinfold was measured in a rotational order. Two measurements were taken to the nearest mm and the mean score was recorded. A third measurement was taken if the first two measurements differed greatly. The skinfold calliper was checked and calibrated according to the manufacturer's instructions prior to each use.

4.6.5.3 Body Mass Index (BMI)

BMI, also known as Quetelet's Index, is the most common way to measure obesity by using an index of weight-for-height (kg/m^2). BMI is useful to assess obesity of large populations relatively straightforwardly because the indices can be applied to males and females, and adults of all ages (Table 5).

Table 5 The International Classification of adult underweight, overweight and obesity according to Body Mass Index (BMI)

Classification	BMI(kg/m^2)	
	Principal cut-off points	Additional cut-off points
Underweight	< 18.50	< 18.50
Severe thinness	< 16.00	< 16.00
Moderate thinness	16.00 - 16.99	16.00 - 16.99
Mild thinness	17.00 - 18.49	17.00 - 18.49
Normal range	18.50 - 24.99	18.50 - 22.99
		23.00 - 24.99
Overweight	≥ 25.00	≥ 25.00
Pre-obese	25.00 - 29.99	25.00 - 27.49

Classification	BMI(kg/m ²)	
	Principal cut-off points	Additional cut-off points
		27.50 - 29.99
Obese	≥ 30.00	≥ 30.00
Obese class I	30.00 - 34.99	30.00 - 32.49
		32.50 - 34.99
Obese class II	35.00 - 39.99	35.00 - 37.49
		37.50 - 39.99
Obese class III	≥ 40.00	≥ 40.00

Source: (World Health Organisation, 2013)

According to guidelines by the National Institute for Health and Clinical Excellence (NICE) in the UK, BMI in conjunction with waist circumference (WC) should be used as a method to measure central obesity to determine increased risk of obesity-related morbidity (Table 6).

Table 6 Assessing overweight and obesity health risks using BMI and WC

BMI Classification	Waist circumference		
	Low	High	Very high
Normal weight	No increased risk	No increased risk	Increased risk
Overweight	No increased risk	Increased risk	High risk
Obesity I	Increased risk	High risk	Very high risk
Obesity II	Very high risk	Very high risk	Very high risk
Obesity III	Very high risk	Very high risk	Very high risk

Source: (National Institute for Health and Clinical Excellence, 2006)

The risk categories for WC according to the NICE guidelines for men are: < 94cm as low risk, 94 – 102cm as high risk and > 102cm as very high risk. For women, WC risk categories are: < 80cm as low risk, 80 – 88cm as high risk and > 88cm as very high risk.

4.6.5.4 Waist-to-hip ratio (WHR)

WHR is another method of determining the level of risk of obesity-related morbidity such as cardiovascular disease (CVD) and diabetes, by measuring central abdominal obesity using WC and HC. WHR is calculated by using the equation: $[WC/HC]$. WHO publications used waist circumference and waist-hip ratio to assess the risk of developing metabolic syndrome by using applicable sex-specific cut-off points (World Health Organisation, 2011b). A WHR that is $\geq .90$ cm for males and $\geq .85$ cm for females is considered at increased risk of metabolic syndrome.

4.6.5.5 Body fat percentage (BF%)

According to the WHO technical report on physical status, BMI is an indicator of excess energy deposition as fat, however, body fat percentage (BF%) increases with age and its deposition differs in males and females (World Health Organisation, 1995). BF% is higher in females than males and BMI may not reveal these differences, causing a misclassification to categorise individuals (US Department of Health and Human Services, 1998). BF% can be applied to assess individuals by their deposition of body fat by age and sex to provide more accurate information for individuals who have a low body mass index and potentially a high BF%.

In order to calculate body fat, body density (BD) was first calculated using the equation of Durnin and Womersley (1974), adapted for age and sex. Table 7 refers to the logistic regression equations that were used to determine BD. X is the log sum of four skinfolds (triceps, biceps, subscapular and suprailiac).

Table 7 Body density equations, adapted for age and sex

Age (years)	Equations for males	Equations for females
17-19	$BD = 1.1620 - (0.0630x)$	$BD = 1.1549 - (0.0678x)$
20-29	$BD = 1.1631 - (0.0632x)$	$BD = 1.1599 - (0.0717x)$
30-39	$BD = 1.1422 - (0.0544x)$	$BD = 1.1423 - (0.0632x)$
40 -49	$BD = 1.1620 - (0.0700x)$	$BD = 1.1333 - (0.0612x)$
> 50	$BD = 1.1715 - (0.0779x)$	$BD = 1.1339 - (0.0645x)$

Source: (Durnin and Womersley, 1974)

The equation by Brožek et al. (1963) was used to determine BF%, namely $(4.570/BD - 4.142) \times 100$. Fat mass content (FM) (kg) was calculated using $(BF\% \times BM)/100$. Lean body mass (LBM) was calculated using the equation $[BM - FM]$.

4.6.6 Qualitative interviews

All client interviews took place in pharmacy consultation rooms, public areas such as parks, car parks, cafes, on a university campus, on the doorstep of a participant's home, places of employment and local recreational centres. Interview locations were sought out by the researcher prior to the interview by exploring the surrounding area. Pubs were avoided due to some participants' alcohol issues. Participants were met first at the pharmacy and walked together to an appropriate interview location. Each interview was recorded with a digital recording device. Each participant confirmed their permission to have the interview recorded. Confidentiality was reviewed with each participant and participants were given the option to stop the interview if they felt uncomfortable or distressed. On one occasion when a participant became upset, the interview was temporarily stopped, and the participant was given time to regain their composure or to stop the interview. The participant completed the interview. Topic guides for Stages One (baseline) and Two (follow-up) (Appendices J and K) were designed upon the principles of qualitative research practice by Ritchie et al. (2013) which followed the four stages of discussion in interviews (Table 8).

Table 8 Four stages of discussion in interviews

Stages	Discussion description
Stage One	Introduction and context setting
Stage Two	Easy opening questions; more surface level Background and contextual information – preliminary information Definitional/conceptual questions
Stage Three	Core part of interview – questioning and discussion is in more depth Move from circumstantial to attitudinal/evaluative/explanatory questions Move from general to more specific coverage
Stage Four	Winding down Questions looking to the future, suggestions Summarising Information about what happens next, or help and support available (where appropriate)

Source: (Ritchie et al., 2013)

The content of the topic guides were based on factors relating the individual to various factors in the environmental systems during the lifespan, which was derived from the EST model (Bronfenbrenner, 2004). The four stages were applied to the current study (Table 9).

Table 9 Stages of discussion in the current study

Stages	Interview One	Interview Two (Four month follow-up)
Stage One	Introduction	Introduction
Stage Two	Socio-demographic information Physical and mental health Treatment and/or therapy	Socio-demographic information during four previous months Physical and mental health during previous four months Treatment and/or therapy during previous four months
Stage Three	Childhood food consumption Drug use histories Independent living and food Heavy drug use and food OST and food	OST and food during previous four months Explore treatment, prison and/or relapse during previous four months (if applicable)
Stage Four	Food and nutrition knowledge Enablers/barriers to food acquisition and access Thoughts about nutritional guidance	Enablers/barriers to food acquisition and access Thoughts about nutritional guidance Thoughts about future plans

4.7 Data processing and coding

4.7.1 Data protection and anonymisation

Each participant filled out a contact details form for contact during the follow-up stage. Contact details were recorded in a database that was locked with a password. Contact details forms were kept under lock and key in a secure filing cabinet on the university campus for the duration of fieldwork. Each participant was assigned a reference number and pseudonym. After the end of data collection, contact details were destroyed and the database deleted.

4.7.2 Data entry

Data from 24HR were entered in the dietary software package Dietplan for Windows (Forestfield Software Ltd., version 6.70, West Sussex, UK). A pseudonym was entered for each participant and only their month and year of birth were used. BM and height were entered for the profile information. Nutrient intake data for each participant was compared to the RNI. These data were then transferred to a statistical software package for further analysis.

Body composition data were entered in to Microsoft Excel. A spreadsheet was created that included each participant's reference number, age, sex, height, body mass, and body composition measures. BD, BF%, WHR, LBM, and FM were calculated in the spreadsheets and transferred to a statistical software package for further analysis.

A spreadsheet for the quantitative data was created in the statistical software program International Business Machines (IBM) Statistical Package for Social Sciences (SPSS) for Windows (version 21.0, Chicago, IL, USA). Data from the socio-demographic questionnaire, HRQOL, nutrient intake and body composition measures were entered under each participant's numeric reference code. Data from the HRQOL were coded according to the SF-36 instructional guidelines (Ware et al., 2000). Data were coded as numbers such as Male (1) Female (2), except for variables such as prescription drug names. Continuous variables such as body mass, weight,

height and so forth did not require coding and were entered directly. Variables that were answered as '0' were entered as '0' and missing variables were coded as missing and entered as -999.00.

4.7.3 Dietary intake coding

Dietary intake was separated into five days. Each food was located in the food database and coded by its type and processing method. Weight was calculated from the photographic food atlas of portion sizes (Nelson et al., 1997). Packaged food weights were calculated from portion sizes provided by the Food Standards Agency (Food Standards Agency, 1988). Food items such as ready meals and takeaways were compared with the nutritional content of a similar item in the food database in Dietplan6. When the nutritional content between the two items differed greatly, the nutritional content of the food item was recorded from package labelling or nutritional content from the manufacturing company and entered manually.

4.7.4 Interview transcription and coding

Semi-structured interviews were transcribed verbatim by the researcher and a professional transcriber. Each transcription was checked and edited for mistakes and errors. Pseudonyms replaced any names and place names. The qualitative coding software program MAXQDA for Windows (VERBI GmbH, version 11.0, Berlin, Germany) was used to code interviews and observation notes.

Initially, a coding frame was developed using the structure of the topic guide. Coding separated the data first into large, overarching sections that covered periods throughout an individual's lifespan such as current socio-demographic information, childhood food consumption, periods of independent living, residential treatment, prison, and previous and current drug use and OST. Within each section, the content was coded further into detailed sections such as digestive health, physical health, mental health, food acquisition, cooking and facilities. Using inductive coding,

lines of interview data that required a new code were actively assigned during the coding process and added to their appropriately corresponding sections.

The data were then analysed using the Framework approach through familiarisation (immersing one's self in the data to gain an overview of the content), thematic framework construction (topics from participants' experiences that were sorted into themes), indexing and sorting (data annotation and labelling of data that belonged together), charting (themes were arranged together with clearly defined headings and subheadings) and mapping and interpretation (finding associations, explanations, breaking down the phenomena that reflected the participants' beliefs) (Ritchie and Spencer, 1994).

In the current study, familiarisation was gained through the transcription writing and editing processes. Coded data were analysed per section and sorted into themes with the aid of a software program. Each theme was sorted separately and charted with headings and subheadings into Microsoft Excel. From the headings, subheadings and coded data extracts, the beliefs and attitudes of the participants was interpreted to determine the factors that are influenced by participants' food consumption and food acquisition patterns.

4.8 Quality assurance

Inconsistency and measurement error were areas of concern throughout the study period. Measures were taken to avoid inconsistency at various stages throughout the study. In preparation for anthropometric parameters and to reduce the technical error of measurement (TEM), training was undertaken under the mentorship of two practiced anthropometrists. Subsequently, 20 practice volunteers and four pilot participants were measured prior to the main study. The same equipment was used on the practice volunteers and throughout the study for all participants. The researcher conducted and recorded all of the anthropometric measurements.

Dietary intake training was undertaken prior to the main study. Training was undertaken to ensure interviews and coding were consistent. Practice sessions with ten volunteers and four pilot

participants took place prior to the main data collection. One interviewer recorded all of the food entries and coded all of the food items.

Care was taken to avoid inconsistency and avoid observer bias during 24HR and dietary intake coding. Supermarkets and food products for major food retailers were researched prior to the commencement of data collection. Any products that were purchased from corner shops and independent stores were researched on a case-by-case basis. Participants who had difficulty recollecting food items were encouraged to bring in the packaging labels. Any participants who bought foods that were not included in the database were bought by the researcher in the same format as the participant from the same shop to confirm the following: the food item, the cuisine and the contents of the food. In the event the food was entirely new, a recipe was compiled for the ingredients in the dish.

4.9 Data analysis procedure

Statistical analysis was undertaken using SPSS. Standard statistical methods, suitable for small sample sizes, were used to analyse the data (de Winter, 2013, VanVoorhis and Morgan, 2007, Umali et al., 2006). Frequencies were first tabulated for categorical data to report socio-demographic variables and drug and alcohol use of the population sample at both baseline and the four month follow-up. Mean values and standard deviations were calculated for continuous data. Participants were analysed as a total group and separated into categories by sex.

4.9.1 SF-36 HRQOL

A study conducted by Jenkinson et al. (1999) reported SF-36 scores for the UK general population. Three previous studies compared the mean SF-36 scores to general population scores: one in Australia, one in New Zealand and one in the UK (Ryan and White, 1996, Deering et al., 2004, Neale, 2004). The total population sample in the Jenkinson study was above 8000 participants, much larger than the current study's population sample size. Welch's t-test was

considered to address the unequal sample sizes of the current study's population and the UK general population sample in the Jenkinson study. The difference between the mean scores of the UK general population sample and the current study sample were calculated according to each of the eight scales (*Physical Functioning, Role Limitations due to Physical Health, Pain, General Health, Energy & Vitality, Social Functioning, Role Limitations due to Mental Health, and Mental Health*) and analysed. The paired samples t-test was also used to determine whether the mean difference between paired observations in the study sample were significantly different at baseline and follow-up.

4.9.2 Anthropometric measures

According to Neale et al. (2012), visible differences in appearance were seen in their study at the four month follow-up period. Frequencies, means and standard deviations were first run to explore the distribution of participants' BMI and BF%. The group was separated by sex and analysed accordingly. To test for physical differences at baseline and the four month follow-up in the current study, a paired t-test for males and females was run to compare the differences in BF%. The results of the test determined if significant physical differences occurred in the study population in a short period of time.

The NICE guidelines recommend the use of WC to compare with BMI to test for long-term health risks (National Institute for Health and Clinical Excellence, 2006). The correlation between WC and BMI were tested for appropriate application to the current population sample. A Spearman's rank-order correlation was run to investigate the relationship between participants' waist circumference and BMI. Preliminary analysis showed the relationship to be monotonic as assessed by visual inspection of a scatterplot. There was a strong positive correlation between waist circumference and BMI in the current study, $r_s(23) = .814, p < .001$. WC and BMI were assessed according to the NICE guidelines and reported accordingly.

4.9.3 Macro-/Micro-nutrient intakes

Comparative analyses were conducted for all of the macro-/micro-nutrients using mean actual intake (AI) compared to the RNI. The difference (DIFF) between the two intakes was determined by the equation $[DIFF = AI - RNI]$. The significance of the difference was tested using the Student's t-test. A non-directional test was used to determine whether the mean AI was less than or greater than the RNI. The results of the analysis included 95% confidence interval and a p value with significance at $p < .05$. When a recommended intake was given as a recommended safe intake range, the mean (SD) actual intake was reported and the range of the actual intake was compared to the safe intake range.

A Spearman's rank-order correlation was run to determine the relationship between energy intake and macronutrient intakes in the current study sample. Carbohydrate intake (CHO), total sugar intake, glucose intake, non-milk extrinsic sugars intake (NMES), maltose intake, fructose intake, sucrose intake, lactose intake, total fat intake, saturated fatty acids (SAT) intake, mono-unsaturated fatty acids (MUFA) intake, poly-unsaturated fatty acids (PUFA) intake, *trans* fatty acids and cholesterol intake and protein intake were analysed. The significance of the p value was $p < .01$ for all of the analysed nutrients except for PUFA and protein (correlation significance was $p < .05$).

4.9.4 Qualitative data

The semi-structured interview schedule informed the initial themes and analysis of the qualitative interview data. As coding progressed, new themes emerged through an iterative process of exploration. Themes were organised according to time periods for transitional phases – childhood, moving out of the family home, heavy drug use and OST. Under the larger, overarching themes, sub-themes that emerged from the data were categorically organised. For example, under the childhood theme, sub-themes such as family eating, food likes and dislikes, meals and cooking, and dining practices. Participants' perspectives about each corresponding sub-theme were investigated to assess how they viewed their circumstances and how they

processed their environments through their expressions and inflections in their explanations. Multiple similar responses from participants under one sub-theme were grouped together to form matrices. The themes with abundant responses across the participants group became the major themes to discuss in depth in the results chapters.

The analysis for Chapter Seven included the earlier time periods during the life course namely, childhood, moving out of the family home and heavy drug use. Rather than conduct interviews at multiple time points, it was considered by the researcher to include transitional phases such as childhood eating behaviours to understand if family traditions and cultural traditions can influence eating behaviours and food consumption decisions into adulthood. While childhood or moving out of the family home may have coincided with heavy drug use periods, a majority of participants had separated time periods with distinct transitional phases. The longitudinal follow-up in the current study was not repeatedly administered and thus, differences over a period of time during the research study period were difficult to establish. Furthermore, the EST model refers to the four distinct systems to organise an individual's environment with the chronosystem (i.e. time) as the distinctive factor to consider over the life course (Bronfenbrenner, 2004).

Chapter Eight reported the results of the qualitative interview data for the two time periods when participants were receiving OST and the four month follow-up to the study. The researcher focused on complementing the quantitative results by asking further questions about physical and mental health areas. This chapter focused on fundamental aspects of dietary behaviours such as food acquisition, food preparation and nutritional knowledge. These were analysed to understand the foundation of knowledge that informed participants' decision-making processes. Cooking, nutritional knowledge, household budgeting has varying levels of practical skills and techniques, however these areas have not been addressed in previous literature of this population. It is necessary to understand the grounding of individuals and their perspective of their own skills in order to understand the necessity of guidance or interventions. The analysis of practical skills could identify new potential research areas and practice implications through the identification of gaps in knowledge.

4.10 Overview

Due to limited literature, a mixed methods approach was suited to the current study to produce primary indicative results. The data collection and feedback from the pilot participants provided recommended modifications to streamline the main study prior to its commencement. The overall research design, the ethical issues, confidentiality and sensitivity of the participants and the data were described. Furthermore, the steps to collect anthropometric measures, dietary intake data, qualitative interview data, and their processing and cleaning were elaborated in detail. A clear data analysis procedure was developed from previous studies and recommended UK guidelines such as WHO, NICE and RNI. Care was taken throughout the study to ensure the quality of the data collection and its management.

Chapter 5 Background characteristics of people receiving OST

5.1 Introduction

This chapter discusses the background characteristics of people receiving OST. Factors such as age, sex, ethnicity, education, employment, accommodation social networks, tobacco, alcohol and illicit drug use, and prescribed drug use are reported. The general health Short Form 36 (SF-36) Health Related Quality of Life (HRQOL) questionnaire scores are reported to estimate self-perceived health statuses of people receiving OST and how those scores compare to the UK general population. Participants' socio-demographic and general health characteristics are reported using quantitative and qualitative data results.

5.2 Socio-demographic background

Thirty-three individuals were recruited to the study and twenty-five participants successfully completed the first stage (76%). At follow-up, twenty participants successfully completed the second stage (60% of initial recruitment group). Five participants (20%) dropped out of the second stage of the study. Two participants relapsed on drugs and could not be located. One respondent dropped out midway through the follow-up to actively pursue a long-distance relationship. One respondent refused to participate because her benefits eligibility was reassessed and reduced. She needed to find employment as soon as possible to support her family. One respondent returned to his country of origin and was not available.

The mean age (SD) of the participants was 38.2 (8.8) years (Table 10). The largest age group was 40-49 year olds. The mean age (SD) for males was 41.5 (7.2) years, while the mean age (SD) for females was 33.4 (9.1) years. Over half of the females in the study were under the age of 30 years. Twenty participants (80%) identified themselves as White British or White Irish, and 5 participants (20%) as Mixed or Other Background. The study population group's ethnic

background and percentages reflected that of people in contact with drug treatment or General Practitioners (GPs) in England (Public Health England, 2013).

Table 10 Demographic characteristics of people receiving OST at baseline and follow-up

Demographic Characteristics	Baseline (N=25)	Follow-up (N=20)
Age (years)	Mean (SD)	Mean (SD)
Age (years)	38.2 (8.8)	38.6 (9.8)
	<i>n</i> (%)	<i>n</i> (%)
20-29 years	6 (24%)	4 (20%)
30-39 years	7 (28%)	6 (30%)
40-49 years	10 (40%)	7 (35%)
50-59 years	2 (8%)	3 (15%)
Sex	<i>n</i> (%)	<i>n</i> (%)
Males	15 (60.0%)	12 (48.0%)
Females	10 (40.0%)	8 (32.0%)
Ethnicity	<i>n</i> (%)	<i>n</i> (%)
White British	18 (72.0%)	15 (75.0%)
Mixed Background	4 (16.0%)	4 (20.0%)
White Irish	2 (8.0%)	1 (5%)
Any other Asian Background	1 (4.0%)	NA
Employment	<i>n</i> (%)	<i>n</i> (%)
Yes	2 (8%)	3 (15%)
No	23 (92%)	17 (85%)
State benefits	24 (96%)	18 (90%)

5.2.1 Educational background

According to Table 11, the mean age (SD) participants left school was at 15.6 (1.2) years; ten participants left school without qualifications (40%). Participants who left school with qualifications achieved various levels: seven participants (28%) achieved Certificate of Secondary Education (CSE), General Certificate of Secondary Education (GCSE) or O levels, two participants (8%) achieved A Levels, and one participant (4%) achieved a university degree.

Table 11 Education and qualifications of people receiving OST

Education (N=25)	Mean (SD)
Left school	15.6 (1.2)
Age (years)	n (%)
13 years	2 (8%)
14 years	2 (8%)
15 years	5 (20%)
16 years	13 (52%)
17 years	1 (4%)
18 years	2 (8%)
Highest Qualification	n (%)
None	10 (40%)
CSE/GCSEs	7 (28%)
O levels	2 (8%)
A levels/Irish Leaving Certificate	2 (8%)
University degree	1 (4%)

In the qualitative interviews, participants reported their enrolment in special needs schools that focused on teaching students who had learning difficulties. Participants who were in a special needs education system described the structure of the system and the difficulties they experienced. Two participants explained they had dyslexia and needed further assistance with

reading and writing skills. Harry had undiagnosed dyslexia as a child stated, “I was dyslexic and they [educators] didn’t know...so I was sent to different schools...separated from other kids at a young age” (Harry, Age 47). According to the participants, the special needs schools “didn’t really do that many GCSEs” (Norma, Age 29) but they could receive “distinctions, but they were like lower [than GCSEs]” (Brad, Age 26).

Five participants (20%) achieved diplomas through apprenticeships, returned to school later in their lives or continued with education during imprisonment. National Vocational Qualifications (NVQs), GCSE and A level qualifications were common achievements for participants who trained during employment or attended education courses later in life. At the time of the study, three participants (12%) had enrolled in computer courses or GCSE courses in English and Maths. Sarah returned to education during adulthood and described her experience:

“Yeah, I left school at 16 and I had 6 O-levels. I went back to school when I was 21 and I did A-levels at night school and I got 2 A-levels in English and History. When I was 25, I went back to college and I studied for a degree which was English and History of Art. But I didn’t finish the degree. I got halfway through it; it was a modular course so I got halfway through the course and I didn’t complete it. That’s sort of my formal education.” (Sarah, Age 43)

5.2.2 Employment

Twenty-three (92%) of the sample population group did not hold a job position at the time of recruitment. The remaining two participants (8%) were self-employed or working full-time/part-time. Participants also reported their employment during the previous 3 years from the start of the study (Figure 11). Eight participants (32%) had no employment, seven participants (28%) were disabled or were unable to work due to sickness, 5 participants (20%) held full-time or part-time positions, two participants (8%) engaged in casual work and 3 participants (12%) were in prison. There were no large differences in previous employment when separated by sex.

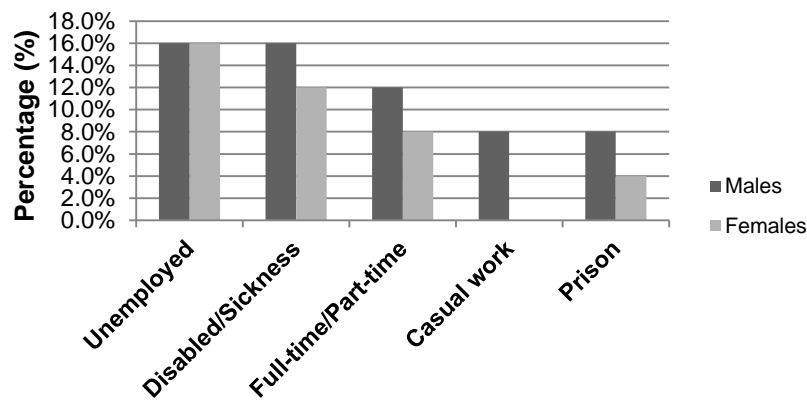


Figure 11 Employment over the previous 3 years separated by sex (15M, 10F)

Participants' employment did not categorically correspond to full-time or part-time formal employment. Participants received cash in hand or worked according to a short-term contract. Other sources of employment that participants reported were selling the Big Issue, busking, roofing, hosting students in the family home, or selling cosmetics. Participants' cited illness, pain, previous injury, limited mobility and disability as barriers to work. Participants also felt restricted in finding employment due to criminal history checks and access to transport. According to Karen: "Now with these CRB [Criminal Records Bureau] checks you never get rid of it [criminal offences]. It's always there you know, to haunt you, sort of thing" (Karen, Age 51).

At the time of follow-up, three participants (15%) were employed: one engaged in self-employment in construction/building work, one acted as a contracted host family to students, and one worked as a youth worker. Participants reported improvements to their employment situations. Brandon described his employment situation:

"So I needed my [driving] license and I've actually gotten off my backside and done it now. I done it, I needed it. I needed it. I get a lot more work now. I'm a real registered business as well now so I get a lot more work." (Brandon, Age 40)

Carmen spoke about her employment:

"I think I had the [job] offer, the last time I saw you. Originally, it was to cover maternity leave for another colleague, but now they said that they'll extend that on, until at least next July. So it's quite good." (Carmen, Age 22)

5.2.3 State benefits

All but one of the participants were receiving some form of state benefit, ranging from Jobseeker's Allowance, Child Benefit, Income Support, Housing, Employment and Support Allowance, and/or Disability Living Allowance. At baseline, 23 participants (92%) were unemployed and received a combination of benefits. Four participants (17%) had their crisis loans or court fines deducted first before they received their state benefits directly to their accounts.

At follow-up, all but two of the participants were receiving state benefits (90%). Participants reported concerns about the restructuring of state benefits, particularly health related benefits such as Disability Living Allowance. Participants spoke about medical examinations and re-assessments of their health conditions. Delia who received a decision about her medical examination asserted: "I'm still receiving it [Incapacity Benefit] but they've told me that I'm not acceptable for it since I've had the medical, but I'm appealing against it" (Delia, Age 33). Participants were still in the process of receiving medical re-assessments and, with the exclusion of one participant, decisions were not yet made.

5.2.4 Accommodation

Over half of the participants rented accommodation from the housing association (64%) (Table 12). One respondent (4%) owned her own house. Four participants (16%) lived in a hostel or shelter, two participants (8%) lived in a bedsit, one respondent (4%) stayed with relatives and one respondent (4%) was sofa-surfing. Eight participants (32%) lived alone, six participants (24%) lived with a partner and/or children, four participants (16%) lived with ex-offenders and homeless, three participants (12%) lived with their siblings, two participants (8%) lived with their friends or in

a shared house with students (8%). Fifteen participants (60%) had children; however, only three participants co-habited with their children (12%).

Table 12 Accommodation and living arrangements at baseline and follow-up

Accommodation	Baseline (N = 25)	Follow-up (N = 20)
	n (%)	n (%)
Own house/flat	1 (4%)	1 (5%)
Social housing (flat/house)	16 (64%)	13 (65%)
Bedsit	2 (8%)	1 (5%)
Hostel/Shelter	4 (16%)	2 (10%)
House/Home of relatives	1 (4%)	1 (5%)
Friend's sofa	1 (4%)	NA
Rehabilitation	NA	1 (5%)
Shared house	NA	1 (5%)
Living Arrangements	n (%)	n (%)
Alone	8 (32%)	6 (30%)
Partner/Children	6 (24%)	7 (35%)
Ex-offenders/Homeless	4 (16%)	2 (10%)
Siblings	3 (12%)	2 (10%)
Friends	2 (8%)	2 (10%)
Students/Shared house	2 (8%)	1 (5%)

At follow-up, thirteen participants lived in a rented flat or house from social housing (65%), one respondent (5%) lived in her own house, one respondent (5%) lived in a bedsit, two participants lived in a hostel or shelter (10%), one respondent lived in at a friend's house (5%), one respondent lived in a shared house (5%) and one respondent was in rehabilitation (5%).

Participants shared their experiences with housing issues and the resulting complications that occurred. Many participants allowed friends and acquaintances to stay in their homes, at times

against the rules of the local council. Several participants complained about their housing facilities, particularly overcrowded conditions by allowing multiple acquaintances to overstay their welcome, or the stresses of living in a hostel with shared facilities. Burt described his overcrowded housing conditions and privacy:

“And my brother can sleep in the living room while we [my partner and I] sleep in the bedroom at night, you know what I mean? Rather than five people sit in one flat...it's just a one bedroom flat, you're not meant to have five people living there... He [acquaintance] was only meant to be there for a week or fortnight, but it's gone on now for three months...instead of waking up in the living room and going to sleep in the living room... Then when [acquaintance's wife] wants to cook something and they normally cook late at night so between ten and midnight... So now me and [my partner] are on the sofa...and they're [acquaintance and acquaintance's wife] coming into the kitchen so there's no privacy, you know what I'm saying?” (Burt, Age 46)

Six participants also hoped to move, having made applications for new accommodation in social housing. Two participants reported they were growing increasingly tired of the area due to anti-social conduct such as “gangs of 16 year olds and 17 year olds drinking and smoking cannabis. And throwing stones at people...It's taken on a malevolent and more sinister level” (Theodore, Age 37). “The older kids up my road keep trying to nick my boyfriend's bike and try to break into the house...But I've just had enough of it” (Irene, Age 28).

Overcrowded conditions and shared facilities in accommodation affected food sufficiency for participants living in the hostel. Catered food and cooking facilities in one of the largest hostels in the local region were troublesome. The hostel served subsidised food to their residents, but participants described the quality of the food:

“They [hostel service] still give meals but you have to buy the tickets. The people, the chefs they got in, the food's not very nice so I don't buy the tickets.” (Norma, Age 29)

Another respondent described the taste of the food in the hostel:

“I love vegetables. Um, I wish I could have them, but the way they cook them at [the hostel], I would never pay £3 for what they serve there. It's really, really bad food. It tastes like water, the vegetables.” (Dana, Age 29)

The hostel also provided the facilities to cook food; however, there were no additional supplies such as pots, pans, dishware or cutlery. The system to utilise the kitchens was also disorganised.

A booking system was available and cooking was monitored by one of the staff. However, the residents could not cook if there was not a member of staff present despite booking in advance.

5.2.5 Social Network

Eighteen participants were not in a relationship (72%). Three participants (12%) were single and in a relationship while four participants were married, in a civil union or living with someone (16%). Of the participants who had a partner, five of the participants' partners previously used illegal drugs but had ceased (71%). Two of the participants' partners were using illegal drugs and were trying to quit (29%).

According to the participants, many of them had partners and children in their past, but were not involved in those relationships at the time of the study. A number of the relationships were complicated and difficult for the participants for reasons such as: partners and/or children who were deceased, children who were given up for adoption, children who were put into foster care, leaving a relationship entirely, or having a partner who caused the respondent anxiety and stress. One participant described her relationship with her current partner: "Our relationship's alright, sometimes it's like a roller coaster" (Norma, Age 29).

Participants also reported the desire for solitude and isolation. Six participants preferred their own company as they "didn't go out and socialise or people don't come round" (Laura, Age 24). Though these participants preferred their own company, they kept regular communication with family and siblings through visits or telephone contact. Seven participants (28%) had daily to fortnightly contact with their family, particularly their mothers. Burt received food from his mother and sisters every month:

"My sister, she cooks it, brings it up and freezes in a tupperware dish. Brings it all up. Cakes, biscuits, things like that...She'll do that every month. One sister and her husband will come down one month with my mum. The next sister and her husband and my mum again will come down the next month." (Burt, Age 46)

At follow-up, six participants (30%) were living alone, eight participants (40%) were living with a partner and/or children, two participants (10%) were living with friends and four participants (20%) were living with others such as ex-users and homeless people, siblings and friends, or students. Over half of the participants were single and not in a relationship (55%). Six participants (30%) were married, in a civil union or living with someone and three participants (15%) were single and in a relationship. There were no significant changes to participant's relationships from baseline to follow-up. Participants who were in a relationship reported their partner's drug use at follow-up. Four partners (44%) were using illegal drugs and trying to quit. Three partners (33%) used illegal drugs previously but had ceased. One partner (11%) never used illegal drugs and one partner (11%) used illegal drugs and was not trying to quit.

5.3 Illicit and non-prescribed drug use

Tobacco, alcohol and illicit drug use data at baseline and follow-up are separated into three days prior to meeting face-to-face with the researcher and one month prior to meeting face-to-face with the researcher.

5.3.1 Tobacco, alcohol, illicit and non-prescribed drug consumption (Three days)

In the three days prior to meeting face-to-face with the researcher at the baseline stage, participants were asked to report their tobacco, alcohol and drug consumption (Table 13). Twenty-two participants (88%) smoked tobacco. The mean (SD) tobacco amount smoked in the previous three days was 15.3 (9.1) cigarettes/roll-ups each day. Fourteen participants (56%) consumed alcohol, of which six participants (43%) reported that they drank on a daily basis. Of the alcohol consumption group, 11 participants (79%) drank above the UK daily recommended limit (three to four units for men, two to three units for women).

Table 13 Baseline and follow-up data of tobacco, alcohol and illicit drug consumption of people receiving OST – Three days

Licit and Illicit Drugs	Baseline (N = 25)			Follow-up (N = 20)		
	Previous three days			Previous three days		
	<i>n</i>	Range of use	Range (Amount used/day)	<i>n</i>	Range of Use	Range (Amount used/day)
Tobacco	22	1-3 days	4-40 cigarettes or roll-ups	18	1-3 days	2-30 cigarettes or roll-ups
Alcohol	14	1-3 days	100ml white wine - 7 500ml cans 9% lager	11	1-3 days	1 500ml can 9% lager - 7 500ml cans 9% lager
Heroin	4	1-3 days	£10-40	5	1-3 days	£10-60
Crack Cocaine	8	1-3 days	£2.50-70	8	1-3 days	£10-60
Cannabis	4	1-3 days	2-4 joints	4	1-3 days	2-4 joints
Ketamine	1	1 day	100mg	1	1 day	300mg
Naproxen	1	3 days	2-3 250mg tablets	NA	NA	NA
Benzodiazepines	1	1 day	3 30mg tablets	NA	NA	NA

Heroin consumption was reported by four participants (16%). Heroin consumption ranged from £10-40. Two participants (8%) smoked/injected heroin all three days. Another two participants (8%) reported smoking/injecting heroin one day in the previous three days. Crack cocaine usage was reported by eight participants (32%) and the amount of consumption ranged from £2.50-70. Of those who used crack cocaine, all eight participants (100%) smoked it. Cannabis use was also reported by four participants (16%). The amount of cannabis consumption varied from two to four joints. One participant (4%) smoked on a daily basis and three participants (12%) smoked once in three days. Illicit benzodiazepines, ketamine and non-prescribed naproxen use were also reported.

In the three days prior to meeting face-to-face for their follow-ups, 18 participants (90%) smoked a mean (SD) of 14.4 (7.0) cigarettes or roll-ups in a typical day. Seventeen participants (85%) smoked tobacco on a daily basis and one participant (5%) smoked once out of three days. Eleven participants (55%) drank alcohol in the previous three days. Nine participants (45%) drank on

each of the three previous days, two participants (10%) drank on one or two of the previous three days. One participant (5%) drank within the UK recommended limits while the remaining ten participants (50%) drank greater than four units per day regardless of gender.

Five participants (25%) used heroin over the three days prior to meeting face-to-face for their follow-ups. Two participants (10%) used heroin on all of the previous three days. Three participants (15%) used heroin on one or two of the previous three days. The amount of heroin used ranged from £10-60. Two participants (10%) percent injected heroin, while three participants (15%) smoked/chased heroin. Eight participants (40%) used crack cocaine in the previous three days. Five participants (25%) used crack cocaine one to two days while 15% used on all three days. The amount of crack cocaine used ranged from £10-60. Of those who consumed crack cocaine, all eight participants (100%) smoked crack cocaine while one of the participants either smoked or injected on occasion. Four participants (20%) smoked cannabis over the previous three days. Three participants (15%) used cannabis on each of the previous three days while one participant (5%) used on one day only.

5.3.2 Tobacco, alcohol, illicit and non-prescribed drug consumption (One month)

Participants were asked to report their tobacco, alcohol and illicit drug consumption for the previous month prior to meeting face-to-face with the researcher. Baseline and follow-up data are reported below (Table 14).

Table 14 Baseline and follow-up data of tobacco, alcohol and illicit drug consumption – One month

Licit and Illicit Drugs	Baseline (N = 25)			Follow-up (N = 20)		
	1 month			1 month		
	n	Range of use	Range (Amount used/day)	n	Range of Use	Range (Amount used/day)
Tobacco	22	27-30 days	4-40 cigarettes or roll-ups	19	2-30 days	2-30 cigarettes or roll-ups
Alcohol	17	1-30 days	100ml white wine - 7 500ml cans 9% lager	12	2-30 days	1 unit - 7 500ml cans 9% lager

Licit and Illicit Drugs	Baseline (N = 25)			Follow-up (N = 20)		
	1 month			1 month		
	n	Range of use	Range (Amount used/day)	n	Range of Use	Range (Amount used/day)
Heroin	8	1-30 days	£10-40	5	3-30 days	£10-40
Crack Cocaine	12	1-30 days	£2.50-80	8	1-30 days	£10-100
Cannabis	7	1-30 days	1-4 joints	5	2-30 days	3-5 joints
Benzodiazepines	2	1-2 days	10 10mg tabs-3 30mg tabs	1	2 days	2 10mg tabs
Ketamine	1	8 days	1g	1	2 days	1g
Naproxen	1	30 days	2-3 250mg tabs	1	8 days	2 250 tabs
Valium	2	1 day	2-5mg tabs	NA	NA	NA
Dihydrocodeine	1	1 day	40 30mg tabs	NA	NA	NA

At baseline, 22 participants (88%) consumed tobacco. The mean amount of tobacco smoked was 15.3 (9.1) cigarettes/roll-ups per day. Twenty-two participants (88%) smoked tobacco six days or more per week in the last 30 days. Seventeen participants (68%) consumed alcohol. Six participants (24%) drank daily and eight participants (48%) drank two to six days per week. Three participants (12%) drank one to three days during the month. Seven participants (28%) drank above the UK recommended limit.

Heroin was consumed by eight participants (32%). Two participants (8%) used heroin on a weekly basis, ranging from two to five days a week. One respondent (4%) consumed heroin on a daily basis. Five participants (20%) used heroin one to three days of the month. The amount of heroin consumed ranged from £10-40. Six participants (24%) reported that heroin use was administered via injection and two participants (8%) used by smoking/chasing. Crack cocaine usage was reported by twelve participants (48%). Six participants (24%) reported crack cocaine usage on a weekly basis, ranging from one to four days a week. Two participants (8%) used crack cocaine on a daily basis. The remaining six participants (24%) reportedly used one to two days in a month. The amount of crack cocaine use ranged from £2.50-80. Eleven participants (44%) smoked crack cocaine and one participant (8%) injected it.

Cannabis use was also reported by seven participants (28%). Cannabis consumption ranged from one to four joints per day. Four participants (16%) reported a total of one to three days of cannabis use per month, two participants (8%) smoked cannabis two to three times a week and one respondent (4%) smoked cannabis on a daily basis. Other reported drug use included illicit benzodiazepines, valium, ketamine and dihydrocodeine. Participants reported varying drugs as their main drug, however thirteen participants (52%) reported crack cocaine (solely or combined with another drug) as their main drug. Eight participants (32%) named heroin (solely or in combination with another drug) as their main drug. Nineteen participants (76%) had previously injected a substance in the past.

At follow-up, tobacco was used by 19 participants (95%). Seventeen participants (85%) smoked tobacco every day, while one respondent (5%) smoked one day a week and one respondent (5%) smoked two days out of the previous month. The mean (SD) amount of tobacco smoked was 14.0 (7.3) cigarettes/roll-ups per day. Six participants (30%) drank alcohol on a daily basis. Five participants (25%) drank one to four days a week while one participant (5%) drank two days out of the month. Only two participants (10%) drank within the UK recommended limits. The remaining ten alcohol consumers drank from a range of one 500ml can of 9% lager to seven 500ml cans of 9% lager per day.

Five participants (25%) in total used heroin. Heroin consumption ranged from three days in one month, two to seven days a week and the amount of use ranged from £10-£40. Four participants (20%) used heroin two to seven days a week. One participant (5%) percent used heroin three days in one month. Two participants (10%) injected heroin, two participants (10%) smoked heroin and one respondent (5%) reported both smoking and injecting the drug. Eight participants (40%) consumed crack cocaine in one month. Crack cocaine consumption ranged from one to two days a month to one to seven days a week. Five participants (25%) used crack cocaine one to seven days a week. Three participants (15%) used crack cocaine one to two days in one month. The range of consumption spanned from £10-100. All five of the participants (100%) smoked crack cocaine while one of the participants also injected the drug on occasion. Five participants (25%) used cannabis in one month. Cannabis use ranged from two days out of the month, four to seven days a week. The amount ranged from three to five joints. All of the participants (100%) who

used cannabis smoked the drug. One respondent (5%) used illicit benzodiazepines, one respondent (5%) used ketamine and one respondent (5%) used non-prescribed naproxen. Four participants (20%) injected a drug at the follow-up stage.

5.4 Prescribed drug use

Methadone and methadone sugar-free were prescribed to a majority of the participants. Five participants (20%) were receiving methadone with sugar and 13 participants (52%) were receiving methadone sugar free. The mean (SD) dose of methadone that was prescribed was 68.0 (23.9) mg/day. The methadone sugar-free findings were similar, with participants receiving 65.2 (32.2) mg/day. Buprenorphine was prescribed to seven (28%) participants, with a mean amount of 10.5 (12.4) mg/day. Eleven participants (44%) received two or more prescriptions for multiple physical and/or mental health conditions. Anti-depressants were prescribed to ten (40%) participants, primarily Citalopram, Mirtazapine, Sertraline and Fluoxetine. Mirtazapine was prescribed to six (60%) participants receiving anti-depressants. Four participants (16%) were prescribed Omeprazole to treat stomach acid and other stomach afflictions. The anti-psychotics Olanzapine or Amisulpride was prescribed to three participants (12%). Diabetes mellitus 1 or 2 was also reported in the study findings. Three participants (12%) had either form of the condition.

At follow-up, one respondent (5%) relapsed on heroin and was not receiving an opioid substitution prescription. Fifteen (75%) participants were receiving a mean (SD) amount of 64.4 (37.7) mg/day of methadone sugar-free. Three participants (15%) receiving buprenorphine were prescribed a mean (SD) amount of 13.4 (16.1) mg/day. One participant (5%) was receiving methadone with sugar (50 mg/day). Nine participants (45%) received two or more prescriptions for multiple physical and/or mental health conditions. Anti-depressants were prescribed to ten participants (50%). Mirtazapine, citalopram and sertraline were the primary medications prescribed to the participants. Pain medication was also prescribed to four participants (20%) in the form of dihydrocodeine, diclofenac, co-codamol and gabapentin. Participants were prescribed multi-vitamin, vitamin supplements such as thiamin, and fibre or laxatives, but were not used regularly or taken at all.

Reduction on methadone was reported by a majority of the participants at follow-up. Between the baseline and the four month follow-up stages, two participants (10%) topped up their doses of methadone or buprenorphine by buying extra doses on the street. Psychotherapy was also mentioned by the participants, but there were more participants who reported the need for psychological counselling than participants who were receiving or had received some form of psychological therapy.

5.5 General Health

The Short Form (SF-36) Health-Related Quality of Life (HRQOL) questionnaire was used to measure eight scales: *Physical Functioning*, *Role Limitations due to Physical Health*, *Pain*, *General Health*, *Energy & Vitality*, *Social Functioning*, *Role Limitations due to Mental Health*, and *Mental Health* (Ware et al., 2000, Ware and Sherbourne, 1992). Scores for the eight scales were compared with baseline and follow-up characteristics of the 20 participants who completed both stages of the study.

5.5.1 Analysis of general health status

According to Table 15, data from the SF-36 for people receiving OST at baseline in the current study were compared to the UK general population data from a large community sample (Jenkinson et al., 1999).

Table 15 Mean (SD) SF-36 HRQOL scores of OST group at baseline and a sample of the UK general population (Jenkinson et al., 1999)

Dimensions	OST Group (N = 25)		UK population norms			Difference between mean scores	P-value
	Mean	SD	n (by scale)	Mean	SD		p
Physical functioning	73.3	30.9	8561	87.9	19.7	14.6	$p = .19$
Role – physical	55.9	42.9	8713	87.2	22.0	31.3	$p < .001$
Pain	53.4	29.8	8789	78.8	23.0	25.4	$p < .001$
General health	41.8	28.3	8620	71.1	20.4	29.3	$p < .001$
Energy/vitality	41.2	19.6	8772	58.0	19.6	16.8	$p < .001$
Social functioning	57.4	29.7	8776	82.8	23.2	25.4	$p < .001$
Role – mental	43.1	40.4	8738	85.8	21.2	42.7	$p < .001$
Mental health	52.7	19.0	8775	71.9	18.2	19.2	$p < .001$

The mean scores for people receiving OST were substantially lower than the UK general population data for each of the eight scales. Due to the difference in sample sizes in the OST group and the UK general population, Welch's t-test was run to determine if there were differences in the SF-36 health scale scores between the OST recipient group and the UK general population. The difference between the mean scale scores of the OST recipient group at baseline and the UK general population were statistically significant for seven scales: *Role Limitations due to Physical Health* [95% CI, 38.2 to 73.6, $t(576.9) = -3.65$, $p < .001$], *Pain* [95% CI, 41.1 to 65.7, $t(578.0) = -4.26$, $p < .001$], *General Health* [95% CI, 30.1 to 53.5, $t(577.7) = -5.17$, $p < .001$], *Energy & Vitality* [95% CI, 33.1 to 49.3, $t(579.3) = -4.28$, $p < .001$], *Social Functioning* [95% CI, 45.1 to 69.6, $t(578.0) = -4.27$, $p < .001$], *Role Limitations due to Mental Health* [95% CI, 26.4 to 59.8, $t(576.9) = -5.28$, $p < .001$], and *Mental Health* [95% CI, 44.9 to 60.5, $t(579.0) = -5.05$, $p < .001$]. For the seven scales, people receiving OST had statistically significant lower scores with considerably lower means. The difference in the scores for *Physical Functioning* had greater variation among the current study's population sample and the difference from the UK general population norms was not statistically significant.

SF-36 scale scores from the OST group at follow-up were compared to the UK general population data (Table 16). All eight mean (SD) scale scores for the OST group were lower than the UK general population data. All of the mean differences for each scale were statistically significant: *Physical Functioning* [95% CI, 48.2 to 81.8, $t(362.5) = -2.86$, $p < .005$], *Role Limitations due to Physical Health* [95% CI, 28.5 to 69.1, $t(361.4) = -3.96$, $p < .001$], *Pain* [95% CI, 33.7 to 62.5, $t(361.9) = -4.47$, $p < .001$], *General Health* [95% CI, 26.9 to 52.1, $t(362.0) = -5.25$, $p < .001$], *Energy & Vitality* [95% CI, 32.7 to 50.3, $t(362.8) = -3.94$, $p < .001$], *Social Functioning* [95% CI, 41.1 to 67.7, $t(362.1) = -4.45$, $p < .001$], *Role Limitations due to Mental Health* [95% CI, 22.2 to 61.2, $t(362.4) = -4.73$, $p < .001$], and *Mental Health* [95% CI, 44.0 to 61.6, $t(362.5) = -4.54$, $p < .001$].

Table 16 Mean (SD) SF-36 HRQOL scores of OST group at follow-up and a sample from the UK general population (Jenkinson et al., 1999)

Dimensions	OST group (N = 20)		UK population norms			Difference between mean scores	P-value
	Mean	SD	n (by scale)	Mean	SD		p
Physical functioning	65.0	35.8	8561	87.9	19.7	22.9	$p < .005$
Role – physical	48.8	43.3	8713	87.2	22.0	38.4	$p < .001$
Pain	48.1	30.7	8789	78.8	23.0	30.7	$p < .001$
General health	39.5	26.9	8620	71.1	20.4	31.6	$p < .001$
Energy/vitality	41.5	18.7	8772	58.0	19.6	16.5	$p < .001$
Social functioning	54.4	28.5	8776	82.8	23.2	28.4	$p < .001$
Role – mental	41.7	41.7	8738	85.8	21.2	44.1	$p < .001$
Mental health	52.8	18.8	8775	71.9	18.2	19.1	$p < .001$

Three studies compared the mean SF-36 scores to general population scores, one in Australia, one in New Zealand and one in the UK (Deering et al., 2004, Neale, 2004, Ryan and White, 1996). All three studies reported lower scores in six scales or more upon comparison of a drug misuse group seeking treatment and general population norms according to country. The current study group also coincides with previous studies. Lower mean scores were reported for all eight SF-36 scales for people receiving OST when compared to the UK general population from a 1999 study

(Jenkinson et al., 1999). The difference in mean scores was statistically significant for all eight scales in the current study.

5.5.2 SF-36 scales analysis and results

For the scales analyses, a paired samples t-test was used to determine whether there was a statistically significant difference between follow-up and baseline data in 20 participants who completed both stages of the current study (Table 17).

Table 17 Mean (SD) SF-36 HRQOL scores of OST group at baseline and follow-up

Dimensions	Baseline (N = 20)		Follow-up (N = 20)		Difference between mean scores	P-value
	Mean	SD	Mean	SD		<i>p</i>
Physical functioning	73.3	30.9	65.0	35.8	-8.3	.671
Role – physical	55.9	42.9	48.8	43.3	-7.1	.470
Pain	53.4	29.8	48.1	30.7	-5.3	.682
General health	41.8	28.3	39.5	26.9	-2.3	.367
Energy/vitality	41.2	19.6	41.5	18.7	0.3	.905
Social functioning	57.4	29.7	54.4	28.5	-3	.618
Role – mental	43.1	40.4	41.7	41.7	-1.4	.518
Mental health	52.7	19.0	52.8	18.8	0.1	.611

For the *Physical Functioning* scale, one outlier was detected that was more than 1.5 box-lengths from the edge of the box in a box plot analysis. Inspection of the value did not reveal it to be extreme and it was included in the analysis. The scores at baseline and follow-up were normally distributed, as assessed by Shapiro-Wilk's test ($p = .098$). There was no significant difference between the *Physical Functioning* mean (SD) scores at baseline and follow up, quoted as the mean difference between follow-up and baseline scores [2.3 (23.3), 95% CI, -8.7 to 13.2, $t(19) = .432$, $p = .671$, $d = .10$].

Scores for the *Social Functioning* scale were also analysed using a paired samples t-test. There were no outliers in a boxplot analysis of the data. The data were tested using Shapiro-Wilk's test

of normality and were normally distributed ($p = .434$). There was no significant difference between the mean (SD) scores at baseline and follow-up [2.5 (22.1), 95% CI, -7.8 to 12.8, $t(19) = .507$, $p = .618$, $d = .11$].

Role Limitations due to Physical Health and *Pain* scores at baseline and follow-up were assessed using a paired samples t-test. For *Role Limitations due to Physical Health*, there were no outliers in the data that were more than 1.5 box-lengths from the edge of the box in a box plot analysis. The scores were normally distributed according to Shapiro-Wilk's test ($p = .241$). There was no significant difference between the mean (SD) scores at baseline and follow-up, quoted as the mean difference between follow-up and baseline scores [6.3 (37.9), 95% CI, -11.5 to 24.0, $t(19) = .737$, $p = .470$, $d = .16$]. *Pain* scores were also distributed normally according to Shapiro-Wilk's test of normality ($p = .442$) and no outliers were detected in a boxplot analysis. There was no significant difference between the mean (SD) scores for the *Pain* scale at baseline and follow-up, quoted as the mean difference between follow-up and baseline scores [-2.1 (22.8), 95% CI, -12.8 to 8.6, $t(19) = -.416$, $p = .682$, $d = -.09$].

The mean (SD) scores for *General Health*, *Energy & Vitality* and *Mental Health* were assessed using a paired samples t-test. There were no outliers detected in a boxplot analysis for any of the three scales. According to Shapiro-Wilk's test of normality, the *General Health*, *Energy & Vitality* and *Mental Health* scores were distributed normally ($p = .125$, $p = .192$, $p = .365$, respectively). There were no significant differences between the *General Health* scores mean (SD) scores at baseline and follow-up [-1.8 (8.5), 95% CI, -5.7 to 2.2, $t(19) = -.924$, $p = .367$, $d = -.21$]. There was no significant difference between the mean (SD) scores for *Energy & Vitality* at baseline and follow-up [0.3 (9.2), 95% CI, -4.1 to 4.6, $t(19) = .121$, $p = .905$, $d = .03$]. The difference between the mean (SD) scores for *Mental Health* at baseline and follow-up were not significant [1.6 (13.8), 95% CI, -4.9 to 8.1, $t(19) = .518$, $p = .611$, $d = .12$].

The scores for *Role Limitations due to Mental Health* were analysed. Three outliers were detected in a boxplot analysis and upon inspection, were determined to be extreme. The outlier values were genuinely unusual, not the result of measurement error or data entry error. The Wilcoxon signed rank test was conducted to retain the outliers in the analysis. Twelve participants saw no

improvement and three participants indicated that functioning worsened at follow-up. The median difference between the two time points was not significant ($z = .647$, $p = .518$).

In general, the SF-36 scores for the current study group decreased slightly at follow-up, particularly those scores related to physical health and pain. None of the decreases were statistically significant, however, the sample size was small. Participants' mental health scores appeared to stay constant between the baseline and follow-up stages and there was no evidence of a statistically significant decrease. Participants had chronic conditions at the start of the study and their medical conditions had not drastically changed at the time of follow-up. At the baseline stage, participants reported multiple types of illness and medical conditions; some of the conditions had lasting effects that affected daily life and physical functioning. Examples of respondent illness were: severe pain from osteoarthritis, back pain, chronic diarrhoea, ovarian cysts, untreated chlamydia, heart failure, hypothyroidism, chest infections/bronchitis, pancreatitis, Hepatitis C and chronic liver disease. Elliott described the permanence of his pain:

"Because I'm in a lot of pain quite a lot of, well, I'm in pain all the time, 24/7. But, like some days are worse than others. And if it's cold and wet, I really suffer. Like today, I'm in a little bit of pain, it's bearable." (Elliott, Age 46)

During the qualitative interviews, participants spoke at length about the barriers and limitations to their physical and mental health functioning in their everyday lives. Barriers reported were: pain and the inability to exercise, feeling chest pains, experiencing low energy and feeling drained, the insecurity of riding on transport when having chronic diarrhoea, anxiety and panic attacks, mobility limitations from a head and leg injury, hospitalisation for suicide attempts, the worry of being severely underweight and having ill health, having advanced liver cirrhosis, and hospitalisation for a spinal injury. Mental health issues were reported by a majority of participants, particularly depression and feeling low. One participant had a suicidal crisis during the first stage of the study. "My mental health...at the moment, really bad...I had to ring Samaritans last night because I wanted to end my life" (Norma, Age 29).

Participants' personal experiences over the previous four months provided potential insight to understand their circumstances beyond the SF-36 scores. Mental health, in particular, appeared

to change drastically during the interim of the two stages for three participants (15%), but was not reflected in the SF-36 scores averaged over the whole group. Harry attempted suicide in the four months before his follow-up meeting and explained further:

“Yeah and the last, last time I, I’ve been in the hospital. I’ve been in the [psychiatric hospital]. I got really depressed and really down and that. Yeah I only spent about a week and a half in there. And because I said the right things, so I could get out. Yeah I tried to take my life twice. I just got that low. But I’m feeling really fine now. I’m really feeling fine though. I’m getting more, I don’t know, I don’t know why. I just couldn’t handle things at the time.” (Harry, Age 47)

Theodore also had a severe depressive episode before his follow-up: “In September, I was probably closer to suicide than I have ever been, since my early twenties” (Theodore, Age 37). During the depressive episodes, participants’ mental health suffered but at the time of follow-up they asserted they were feeling better about their mental health status. Participants’ physical health had declined during the depressive episodes and began to improve as their mental health status improved. The SF-36 scores captured the improving mental health scores after the participants began to recover from their depressive episodes.

The *Energy & Vitality* scores appeared to stay constant over the course of the study and did not show any statistically significant decrease. Moreover, some participants were actively thinking about their health and making changes to their lifestyle. According to Sherman:

“I stopped having so many people come round the house....They’re not friends. They’re just associates. Drinking partners or drug partners or whatever...That has helped me quite a bit, especially on my [alcohol and drug] intake.” (Sherman, Age 44)

A small number of participants also reported reductions in pain medication and alcohol consumption. Physical activity and the return of emotions from methadone reduction were discussed positively. Brandon stated:

“I like it [the return of emotions] because I’m back to normal, as you can see I’m smiling a lot more. Like in every aspect, it’s not like in a sad way. You smile. You’re happier, doing things. Do you know what I mean. I can’t explain this. This is so weird. It’s so weird.” (Brandon, Age 40)

5.6 Overview

People receiving OST have complicated circumstances that can potentially create barriers to food security and food sufficiency. The majority of the participants were dispersed in age, single, held no employment, lived in social housing and received state benefits. Several participants were receiving cash in hand from other sources. A majority of the participants smoked tobacco while several participants drank moderate amounts of alcohol above the UK recommended limit. Several participants used drugs while receiving OST. A large proportion of participants were receiving multiple prescriptions for health conditions. People receiving OST reported poorer self-perceived physical and mental health as compared to that of the UK general population. Financial, physical and mental health issues may complicate the situation further, preventing participants from pursuing active changes to their lifestyles.

Chapter 6 Body composition, dietary intake and nutrient intake

6.1 Introduction

This chapter focuses on the body composition and dietary intake of people receiving OST. Body composition is explored by considering participants' height and weight, Body Mass Index (BMI), waist circumference (WC), Waist-to-Hip Ratio (WHR), and body fat percentage (BF%). Macro- and micro-nutrient intake analyses are conducted to explore dietary intake. Both dietary intake and body composition data from the baseline and follow-up stages are compared to UK general population data and recommended guidelines.

6.2 Body composition results

Fifteen males and ten females (100%) completed the first stage of the study (Table 18). Twelve males and eight females (both 80%) completed the second stage of the study. The mean age (SD) for males and females at baseline and follow-up were 41.6 (7.2) years and 33.4 (9.1) years, respectively and 43.3 (7.3) years and 31.8 (9.2) years, respectively. The mean (SD) of body mass (kg) for males and females at baseline and follow-up were 77.5 (17.3) and 91.4 (27.0), respectively and 74.3 (17.8) and 96.1 (27.1), respectively. The mean (SD) WHR for males and females were .92 (0.1) and 0.88 (0.1). WHR was higher than the recommended cut-off points for males and females. The risk of developing metabolic complications for both groups in the current study was substantially increased.

Table 18 Body composition characteristics of OST group at baseline and follow-up, separated by sex

Body composition	Males				Females			
	Baseline (<i>n</i> = 15)		Follow-up (<i>n</i> = 12)		Baseline (<i>n</i> = 10)		Follow-up (<i>n</i> = 8)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age (years)	41.6	7.2	43.3	7.3	33.4	9.1	31.8	9.2
Height (cm)	176.0	3.8	176.0	4.2	165.3	7.2	165.0	7.7
Body mass (kg)	77.5	17.3	74.3	17.8	91.4	27.0	96.1	27.1
BMI (kg/m ²)	25.2	5.9	24.1	6.2	33.3	8.6	35.1	8.0
WC (cm)	90.9	15.7	90.5	16.8	96.6	20.0	101.3	16.5
WHR (w/h)	0.92	0.1	0.95	0.1	0.88	0.1	0.84	0.4
Estimated body fat (%)	24.0	10.2	20.0	9.7	39.3	6.3	40.3	5.3

The mean (SD) BMI (kg/m²) at baseline for males and females were 25.2 (5.9) kg/m² (pre-obese class) and 33.3 (8.6) kg/m² (obesity class I), respectively. According to Figure 12, only one female (10%) fell in to the normal range for BMI (18.5-24.9). Nine females (90%) ranged from overweight (pre-obese) to morbidly obese (obesity class III). Seven males (27%) had a normal BMI. Six males (40%) ranged from overweight (pre-obese) to obese (obesity class II). One male participant (6%) had moderate thinness in the underweight category (BMI 16 – 16.99).

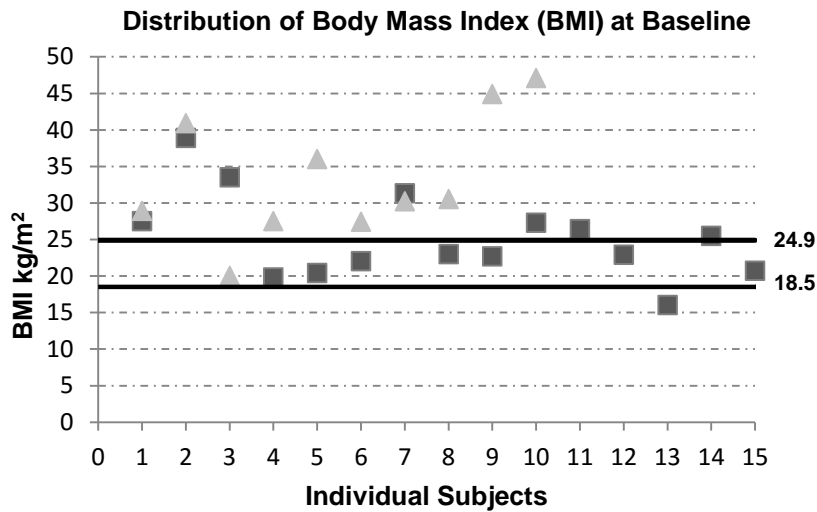


Figure 12 Individual BMI at Baseline: Males ■ (n = 15) and Females ▲ (n = 10)²

At follow-up, males and females had a mean (SD) BMI of 24.1 (6.2) kg/m² and 35.1 (8.0) kg/m², respectively. According to Figure 13, four male participants (33%) fell outside of the normal BMI range, while all eight females (100%) fell outside of the normal range for BMI. Two female participants (25%) were in the overweight, pre-obese classification (BMI 25 – 29.99). Three females (38%) were in Obese class I (BMI 30.00 – 34.99). One female (13%) was in Obese class II (BMI 35.00 – 39.99). The remaining three females (38%) fell in to Obese class III (BMI ≥ 40.00).

² BMI Normal range = 18.5 – 24.9 kg/m²

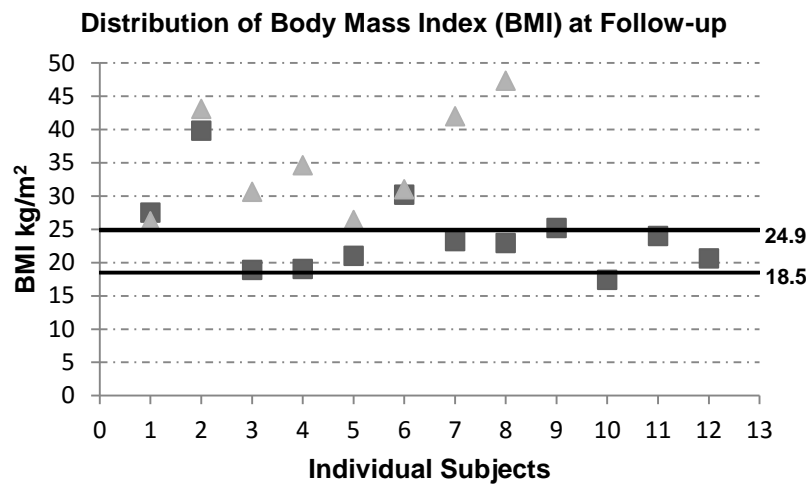


Figure 13 Individual BMI at Follow-up: Males ■ (n = 12) and Females ▲ (n = 8)

The BMI of males and females who successfully completed the baseline and follow-up stages of the study experienced small fluctuations. The majority of individuals (58%) maintained the same or a reduced BMI at follow-up. A total of five males experienced an incremental increase in their BMI, however one male who was in the normal range at baseline rose to the overweight, pre-obese class at follow-up (BMI 25.00 – 29.99). The eight female participants who completed both stages of the study had a BMI > 25 at baseline and follow-up.

According to the Health and Social Care Information Centre for England 2014, the mean BMI for UK males and females in the general population was 27.3 kg/m² and 27.0 kg/m², respectively (Health and Social Care Information Centre, 2014). On average, males in the current study at both baseline and follow-up reported a BMI lower than the general population mean data. The mean BMI for females were higher at both baseline and follow-up than the UK general population mean data.

Due to the large proportion of individuals with a BMI above the normal range at both baseline and follow-up, particularly female participants, a waist circumference and BMI analysis was conducted to assess for further health risks using the NICE guidelines (Table 19). One male participant was excluded as his BMI was 16 kg/m² and could not be applied to the health risk assessment guidelines (National Institute for Health and Clinical Excellence, 2006).

Table 19 Health risk assessment of WC and BMI at baseline and follow-up stages separated by sex

Health risks	Males		Females	
	Baseline N (%)	Follow-up N (%)	Baseline N (%)	Follow-up N (%)
No increased risk	9 (64.3)	8 (72.7)	1 (10.0)	0 (0.0)
Increased risk	2 (14.3)	1 (9.1)	2 (20.0)	1 (12.5)
High risk	1 (7.1)	0 (0.0)	2 (20.0)	2 (25.0)
Very high risk	2 (14.3)	2 (18.2)	5 (50.0)	5 (62.5)

According to the combined assessment of WC and BMI measures, the health risks of developing obesity-related morbidity for participants in the current study were particularly high for females at both baseline and follow-up. All but one female ranged from an increased risk to a very high risk of developing long-term health problems at baseline and at follow-up. All of the females in the study ranged from increased risk to very high risk of developing long-term health problems.

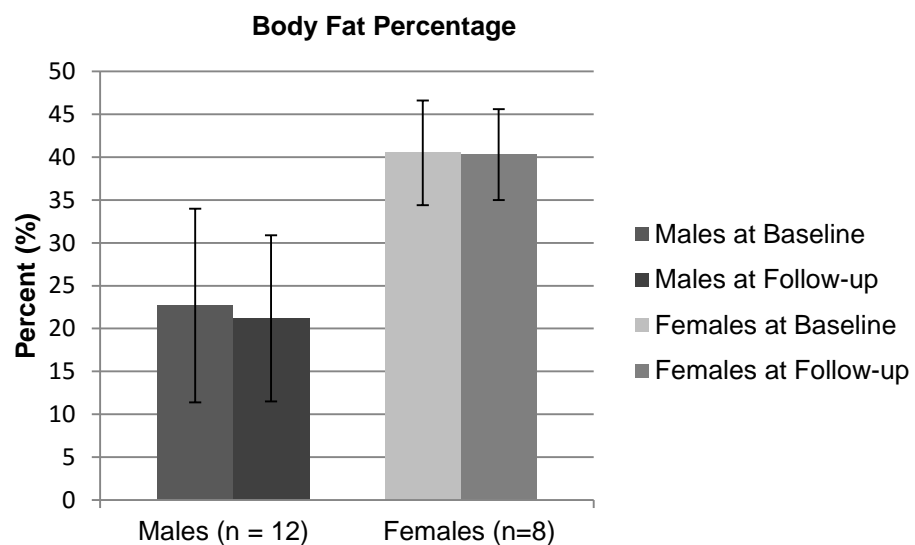


Figure 14 Mean (SD) BF% at baseline and follow-up stages, separated by sex

Body fat percentage (BF%) was analysed further among participants who completed both stages of the study (Males = 12, Females = 8). BF% decreased significantly for males at follow-up [$t(11)$

= -3.946, $p = .002$] (Figure 14). Mean (SD) BF% for males at baseline was 23.3% (11.2) and decreased at follow-up to 20.0% (9.7). The mean (SD) BF% for females was 40.5% (6.3) at baseline. At four months, the BF% for females remained the same [Mean = 40.3%, SD = 5.3]. There were no significant differences for females.

6.3 Energy intake

According to the Scientific Advisory Committee on Nutrition (SACN), the recommended energy intakes were reviewed in 2011 and readjusted. The new energy intake recommendation for males are 2605 kcal/day for men and 2079 kcal/day for females (Scientific Advisory Committee on Nutrition, 2011).

At baseline, the mean (SD) energy intake for the group was 2272 (684) kcal/day. The mean (SD) energy intake for male participants was 2335 (787) kcal/day and 2177 (516) kcal/day for female participants. There was no significant difference between the energy intake of males and females and the recommended energy intake.

The mean (SD) energy intake for the group was 2590 (922) kcal/day at follow-up. The energy intake for males was 2926 (969) kcal/day. The energy intake for females was 2086 (592) kcal/day. There were no significant differences in energy intake over the four month period.

A Spearman's rank-order correlation was run to assess the relationship between energy intake and macronutrient intakes in the current study sample. An examination of the scatterplots suggested the presence of linearity for energy intake and ten macronutrient variables analysed. All of the macronutrients in the table had a positive correlation with energy intake (Table 20). Carbohydrates (CHO) intake, non-milk extrinsic sugars (NMES) intake, and total fat intake had positive correlations with energy intake in the sample. Analyses were run on macronutrients not listed: fructose, sucrose, lactose, *trans* fatty acids and cholesterol intake. However, there was no significant correlation of these latter nutrients with energy intake.

Table 20 Correlation of total energy intake with macronutrient intakes

Spearman's Rank Coefficient (ρ)	Energy Intake	
	$r_s(24)$	p
Carbohydrate intake (CHO)	.648	< .001 ^{3*}
Total sugars intake	.524	.009*
Glucose intake	.555	.005*
Non-milk extrinsic sugars intake (NMES)	.614	.001*
Maltose intake	.576	.003*
Total fat intake	.645	.001*
Saturated fatty acids intake (SAT)	.549	.005*
Mono-unsaturated fatty acids intake (MUFA)	.560	.004*
Poly-unsaturated fatty acids intake (PUFA)	.506	.012 ^{4**}
Protein intake	.478	.018**

3 *Correlation significance at $p = .01$

4 ** Correlation significant at $p = .05$

6.4 Macronutrient intakes and the Reference Nutrient Intake (RNI)

6.4.1 Protein

Average protein intakes in a mixed diet of individuals in developed countries tend to be in excess of the recommended protein intake. It was recommended by the Department of Health that adults avoid protein intakes of more than twice the RNI due to associated health risks that are correlated to excessive protein intake (i.e. 1.5 g/kg/day), however the necessity of a safe upper limit for protein intake is still open to debate (Bilsborough and Mann, 2006, Martin et al., 2005, Barzel and Massey, 1998, Heaney, 1998).

In the UK, the protein RNI is .75 g/kg/day, approximately 54.0 g/day for a male of an average weight of 75 kg and 45 g/day for a female of an average weight of 60 kg. According to the 2003 National Diet and Nutrition Survey (NDNS), mean daily protein intake for males and females was 88.2g and 63.7g, respectively, exceeding the RNI (Henderson et al., 2003). However, protein intake stratified by age was comparatively different among young adults 19 to 24 years (77.8g for males and 59.9g for females) than older adults age 50 to 64 years (88.8g for males and 67.4g for females). Overall, the mean daily protein intake for each sex and age group exceeded the daily RNI (130%).

Protein intake results in the current study revealed similar intake to the general population; the total group as well as the groups separated by sex all exceeded the protein intake RNI. At baseline, mean (SD) daily protein intake for males reached 118% (40.7) of the RNI. For females, the mean (SD) protein intake was 122% (61.9), exceeding the RNI. Protein intake for both males and females was above the RNI, however they were not significantly different from the RNI [$t(14) = 1.785$, $p = .096$; $t(7) = 2.237$, $p = .052$, respectively] (Table 21). There was a significant difference between the actual intake and the RNI for the total group ($t(24) = 2.853$, $p = .009$).

Table 21 Actual versus recommended protein intakes

Protein intake (g/d)	Mean intake (SD)	Baseline	Follow-up
Overall		N = 25	N = 20
	Actual	64.3 (22.6)	76.0 (32.0)
	Recommended	51.2 (5.1)	51.2 (5.1)
	Difference	13.2 (22.9)	24.9 (30.1)
	P-value (<i>p</i>)	.009	.002
Males		N = 15	N = 12
	Actual	65.4 (21.9)	87.8 (34.8)
	Recommended	55.2 (0.8)	55.2 (0.7)
	Difference	10.2 (22.1)	32.6 (35.0)
	P-value (<i>p</i>)	.096	.008
Females		N = 10	N = 8
	Actual	62.5 (24.6)	58.4 (16.8)
	Recommended	45.2 (0.5)	45.2 (0.5)
	Difference	17.4 (24.6)	13.2 (16.6)
	P-value (<i>p</i>)	.052	.059

At follow-up, the protein intake for the total group was significantly different from the RNI ($t(19) = 3.699$, $p = .002$). Protein intake for both males and females were significantly above the RNI and increased above the intake recorded at baseline [$t(11) = 3.233$, $p = .008$; $t(7) = 2.254$, $p = .059$, respectively]. Males' mean (SD) daily protein intake exceeded the RNI at 159% (64.1). The mean (SD) daily protein intake for females exceeded the RNI at 129% (36.5).

6.4.2 Carbohydrates (CHO)

Carbohydrates (CHO) are broken down into sugars, starches and dietary fibre or non-starch polysaccharides (NSPs). Sugars and starches provide dietary energy while dietary fibre contributes to the maintenance of intestinal digestive health.

At baseline, the overall mean (SD) CHO intake for the total group reached 77.6% (29.1) of the daily RNI intake. The mean CHO intake of the subjects was significantly lower than the RNI ($t(24) = -3.492$, $p = .002$) (Table 22). Mean intake for males reached 73.4% (25.1) of the daily recommendation, which was significantly lower ($t(14) = -4.060$, $p = .001$). Mean intake for females reached 77.6% (29.1) of the daily recommendation and was not significantly lower.

Table 22 Actual versus recommended CHO intakes

CHO intake (g/d)	Mean intake (SD)	Baseline	Follow-up
Overall		N = 25	N = 20
	Actual	260.14 (92.6)	289.3 (150.6)
	Recommended	330.6 (36.3)	326.0 (37.6)
	Difference	-70.4 (100.9)	-36.7 (144.0)
	P-value (<i>p</i>)	.002	.268
Males		N = 15	N = 12
	Actual	259.6 (90.1)	315.7 (177.9)
	Recommended	355.6 (20.7)	351.9 (21.2)
	Difference	-96.1 (91.6)	-36.2 (173.8)
	P-value (<i>p</i>)	.001	.485
Females		N = 10	N = 8
	Actual	261.0 (101.2)	249.6 (94.2)
	Recommended	293.0 (14.7)	287.1 (15.8)
	Difference	-32.0 (106.4)	-37.4 (94.1)
	P-value (<i>p</i>)	.367	.298

At follow-up, the overall mean (SD) CHO intake for the total group was 88.5% (42.0) of the RNI. Mean intake of males and females reached 89.5% (48.6) and 87% (32.7) of the RNI. There were no statistically significant differences in carbohydrate intake for the group or separated by sex when compared to the RNI.

6.4.3 Sugars

Sugars can be broken down into monosaccharides, disaccharides and oligosaccharides. With regard to food policy and dietary purposes, sugars are alternatively divided into two groups: intrinsic (already incorporated into food) and extrinsic (added to food) sugars. SACN separated the sugars classification by their cariogenicity - the ability to cause dental caries, and created a sub-group called non-milk extrinsic sugars (NMES). Sugars added to foods such as confectionary, soft drinks, biscuits and cakes are examples of NMES. The proposed NMES intake given by COMA was 60 g/day or 10% of total dietary energy (Department of Health, 1991a). Guidance was also given on high NMES intakes in excess of 200 g/day or 30 percent of dietary energy. NMES provides calories to contribute to energy, but it has limited nutritional value. There

is a risk that excessive NMES intake may increase calorie intake and/or displace the consumption of foods that contain essential nutrients (Howard and Wylie-Rosett, 2002).

Table 23 Actual versus recommended NMES intakes

NMES intake (g/d)	Mean intake (SD)	Baseline	Follow-up
Overall		N = 25	N = 20
	Actual	76.6 (62.0)	77.1 (74.1)
	Recommended	60.0	60.0
	Difference	16.6 (62.0)	17.1 (74.1)
	P-value (<i>p</i>)	.192	.316
Males		N = 15	N = 12
	Actual	73.0 (61.3)	91.9 (84.6)
	Recommended	60.0	60.0
	Difference	13.0 (61.3)	31.9 (84.6)
	P-value (<i>p</i>)	.426	.219
Females		N = 10	N = 8
	Actual	82.1 (65.9)	54.9 (52.0)
	Recommended	60.0	60.0
	Difference	22.1 (65.9)	-5.1 (52.0)
	P-value (<i>p</i>)	.316	.788

The NMES intake for the total group and the group separated by sex all exceeded the daily recommended NMES intake, but the differences were not significant (Table 23). At baseline, mean (SD) NMES intake for the total group was 12.8% (8.1) of total dietary energy at baseline and 11.6% (8.0) of total dietary energy at follow-up. Separated by sex, NMES intake as a mean percentage of total dietary energy for males and females at baseline and follow-up were [12.1% (8.6); 13.4% (7.7); 12.6% (8.5); 10% (7.6), respectively].

6.4.4 Non-starch polysaccharides (NSPs)

NSPs through their physiological effects and biological implications in the human intestine, play an important role in the correct functioning of the digestive system (Kumar et al., 2011). There are two distinct groups of NSPs: soluble and insoluble (the ability to dissolve in water). The insoluble content of NSPs reduce constipation symptoms by increased faecal stool weight and promote bulk to gut contents which allows easier passage through the intestinal tract (Kumar et

al., 2011, Health Education Authority, 1996). Foods such as cereals, grains, fruit and vegetables contain soluble and insoluble NSPs. Currently, the recommended intake of NSPs is 18g for adults in the UK. From the NDNS general population data 2008/09 – 2010/11, adults aged 19-64 years consumed 13.3 – 13.8g of NSPs per day, below the recommendation (Bates et al., 2012).

In the current study, the total group's NSPs consumption was well below the daily RNI (Table 24). The mean daily NSPs intake was significantly lower than the recommended intake at baseline and follow-up [$t(24) = -12.319$, $p < .001$; $t(19) = -7.447$, $p < .001$, respectively]. Separating the groups by sex, both males showed an intake significantly lower than the RNI at both baseline and follow-up [$t(14) = -8.788$, $p < .001$; $t(11) = -4.199$, $p = .001$, respectively]. Females also showed an intake significantly lower than the RNI at both stages [$t(9) = -8.483$, $p < .001$; $t(7) = -10.320$, $p < .001$, respectively].

Table 24 Actual versus recommended NSP intakes

NSPs intake (g/d)	Mean intake (SD)	Baseline	Follow-up
Overall		N = 25	N = 20
	Actual	8.5 (3.9)	9.8 (4.9)
	Recommended	18	18
	Difference	- 9.5 (3.9)	- 8.2 (4.9)
	P-value (p)	< .001	< .001
Males		N = 15	N = 12
	Actual	8.7 (4.1)	11.2(5.6)
	Recommended	18	18
	Difference	- 9.3 (4.1)	- 6.8 (5.6)
	P-value (p)	< .001	.001
Females		N = 10	N = 8
	Actual	8.2 (3.6)	7.7 (2.8)
	Recommended	18	18
	Difference	- 9.8 (3.6)	- 10.3 (2.8)
	P-value (p)	< .001	< .001

Low NSP consumption in the current study suggested participants were obtaining low amounts of NSPs in their diet over a long-term period. Over time, their gut functioning may become compromised and they may suffer from constipation symptoms and bowel issues.

6.4.5 Dietary fats

Dietary fats or lipids provide the body with the densest and richest source of dietary energy. Dietary fats are separated into three groups: saturated fatty acids (SAT), monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA). *Trans* fats are also a type of unsaturated fat, but are created artificially and rarely occur in nature. The UK recommendation for dietary fat intake is no more than 33% (including alcohol) and 35% (excluding alcohol) of dietary energy (Department of Health, 1991a). The recommended intake for monounsaturated fatty acids is an average of 12% of total dietary energy. The polyunsaturated fatty acids intake is approximately 6% of dietary energy. *Trans* fatty acid intake is approximately 5 g/day or 2% of dietary energy.

Table 25 Dietary fats intakes as a percentage of RNI (Baseline)

Dietary fats as a percentage of RNI (out of 100%)	Baseline					
	Males			Females		
	(n = 15)			(n = 10)		
	Mean	SD	p	Mean	SD	p
Total fat	85.1	34.2	.114	97.1	27.2	.747
Monounsaturated fatty acids (MUFA)	79.5	31.0	.022	101.0	28.8	.915
Polyunsaturated fatty acids (PUFA)	67.3	34.8	.003	91.4	35.6	.465
<i>Trans</i> fatty acids	31.7	20.8	< .001	51.2	18.8	< .001

When separated by sex, the mean (SD) total fat intake, MUFA, PUFA and *trans* fatty acid had not exceeded the RNI for males at baseline (Table 25). Intakes for males was significantly below the corresponding RNI for MUFA, PUFA and *trans* fatty acids intake [$t(14) = -2.567$, $p = .022$; $t(14) = -3.641$, $p = .003$; $t(14) = -12.705$, $p < .001$, respectively]. Females' mean (SD) total fat intake and MUFA exceeded the RNI [111.3% (14.0) and 103.5% (13.0), respectively] (Table 26). PUFA and *trans* fatty acids intakes were well below the RNI [84.3% (9.9) and 32.1% (6.7), respectively]. There was a significant difference between *trans* fatty acid intake and the RNI among females ($t(9) = -8.192$, $p < .001$).

Table 26 Dietary fats intakes as a percentage of the RNI (Follow-up)

Dietary fats as a percentage of RNI (out of 100%)	Follow-up					
	Males			Females		
	(n = 12)			(n = 10)		
	Mean	SD	p	Mean	SD	p
Total fat	111.3	49.2	.442	104.8	37.8	.732
Monounsaturated fatty acids (MUFA)	103.5	70.5	.787	99.5	38.3	.972
Polyunsaturated fatty acids (PUFA)	84.3	43.7	.142	72.4	29.5	.033
<i>Trans</i> fatty acids	32.1	23.3	< .001	45.9	35.9	.004

At follow-up, mean (SD) total fat and MUFA for males were above the RNI [111.3% (49.2) and 103.5% (70.5), respectively]. The mean (SD) intake for PUFA and *trans* fatty acids were below the RNI [84.3% (43.7) and 32.1% (23.3), respectively]. There was a significant difference between the *trans* fatty acid intake and the RNI ($t(12) = -10.081$, $p < .001$). For females the mean (SD) total fat intake and MUFA reached the RNI [104.8% (37.8) and 99.5% (38.3), respectively]. Mean (SD) intakes of PUFA and *trans* fatty acids were well below the RNI [72.4% (29.5) and 45.9% (35.9), respectively]. There was a significant difference between PUFA and *trans* fatty acid intakes and the RNI [$t(7) = -2.645$, $p = .033$; $t(7) = -4.264$, $p = .004$].

Trans fatty acids should remain below 2% of dietary energy as it is known to increase low-density lipoprotein (LDL) but also decrease high-density lipoprotein levels of cholesterol which could increase the risk of CVD (Mensink et al., 2003, Ascherio et al., 1999, Willett et al., 1993). However, the PUFA intake for males and females in the current study are not reaching the RNI. PUFA contain the essential fatty acids that are not only necessary for the body, but they also have a preventative effect to reduce the risk of CVD, specifically through the consumption of omega-3 and omega-6 fatty acids (Harris et al., 2008, Mensink et al., 2003, Hu and Willett, 2002, Hu et al., 2002).

6.4.5.1 SAT intakes

Dietary fat intake recommendations are specifically focused on SAT, a type of fat that acts as a contributor to CVD (Hu et al., 2001, Hu et al., 1997, Department of Health, 1991a). The daily saturated fat RNI for males and females is 30g/day and 20g/day, respectively. The NDNS from 2008/2009 – 2010/2011 reported that the mean SAT intake for adults in the general population aged 19 to 64 years exceeded the recommended intake (no more than 11% food energy) at 12.7% (Bates et al., 2012).

At baseline and follow-up, the group's SAT consumption was significantly higher than the RNI [$t(24) = 4.662, p = < .001$; $t(19) = 3.433, p = .003$, respectively] (Table 27). Males and females exceeded the daily SAT intake recommendation at both baseline and follow-up. At baseline, mean SAT consumption for males and females was significantly higher than the RNI [$t(14) = 2.865, p = .012$; $t(9) = 4.618, p = .001$, respectively]. At follow-up, mean SAT consumption for males was significantly higher than the RNI ($t(11) = 3.396, p = .006$). The major contributors of SAT intake among males and females in the current study were full-fat dairy products (cheese, milk, yoghurt, ice cream, cream), confectionary (cakes, tarts, biscuits), meat products (beef, pork and meat topped pizza) and chocolate (chocolate covered granola bars, chocolate bars).

Table 27 Actual versus recommended SAT intakes

SAT intake (g/d)	Mean intake (SD)	Baseline	Follow-up
Overall		N = 25	N = 20
	Actual	31.7 (12.5)	35.2 (19.8)
	Recommended	20.0	20.0
	Difference	11.67 (12.5)	15.2 (19.8)
	P-value (<i>p</i>)	< .001	.003
Males		N = 15	N = 12
	Actual	30.9 (14.8)	40.1 (20.5)
	Recommended	20.0	20.0
	Difference	10.9 (14.8)	20.1 (20.5)
	P-value (<i>p</i>)	.012	.006
Females		N = 10	N = 8
	Actual	32.9 (8.8)	28.0 (17.6)
	Recommended	20.0	20.0
	Difference	12.8 (8.8)	8.0 (17.6)
	P-value (<i>p</i>)	.001	.241

6.5 Micronutrient intakes and the RNI

6.5.1 Water-soluble vitamins

Water-soluble vitamins include the vitamin B complex group: thiamin (vitamin B₁), riboflavin (vitamin B₂), niacin (vitamin B₃), vitamin B₆ (pyridoxine), folate (folic acid), vitamin B₁₂ (cyanocobalamin), biotin and pantothenic acid, and vitamin C [see Table 28]. Water-soluble vitamins are not stored in the body and must be replaced frequently. They also dissolve in water, are destroyed by heat in the cooking process and are lost by exposure to air. Water-soluble vitamins are required in small amounts but play major roles in the body required for growth, metabolism and physiology. Excessive amounts of water-soluble vitamins in the diet are not harmful as they are eliminated through urination.

Thiamin is also involved in providing the central nervous system (CNS) function in the body with energy and plays a role in excitable tissues such as muscle contraction and nerve signal conduction. Thiamin deficiency can present with symptoms such as fatigue, weakness, psychosis, nerve damage and in severe cases, brain damage. Riboflavin aids in haemoglobin production and releasing energy from macronutrients. Riboflavin deficiency is more common in adolescents and the elderly (Powers, 2003).

Niacin is the precursor to nicotinic acid and nicotinamide, coenzymes that are fundamental to the oxidative release of energy. It is required for functioning of the skin, mucous membranes and CNS. Tryptophan can also be used to synthesise niacin in the body. Vitamin B₆ plays a central role in amino acid metabolism. It also aids in haemoglobin production and the metabolism and transport of iron. Vitamin B₆ is essential for the body's protein metabolism.

Folate is a general term for naturally occurring dietary folate found in foods. Folate regulates the production of haemoglobin and cell division. Folate is particularly important during development in utero to prevent birth defects such as spina bifida. Folate deficiency results in megaloblastic anaemia. Symptoms of deficiency include: insomnia, depression, forgetfulness and irritability,

diarrhoea, mouth ulcers and peptic ulcers. Vitamin B₁₂ is a cofactor for enzymes to regulate the normal functioning of the CNS, haemoglobin production and myelin sheath production. It is also involved in folate metabolism and energy production. It is a water soluble vitamin that is found in all foods of animal origin. Deficiency can lead to megaloblastic anaemia and neurological problems, but dietary deficiency only occurs in strict veganism.

Biotin serves as a coenzyme in bicarbonate-dependent carboxylations and is crucial for the metabolism of fatty acids, amino acids and glucose. Biotin deficiency may occur during pregnancy. Intestinal malabsorption, excessive alcohol consumption, and long-term use of medications such as antibiotics, antiseizure medication and anticonvulsants may put individuals at potential risk of biotin deficiency (Zempleni et al., 2008).

Pantothenic acid is necessary to synthesise Coenzyme-A, and in the formation of acyl carrier protein. Due to the wide availability of pantothenic acid in small amounts from diverse sources, pantothenate deficiency is rare. Vitamin C is involved in the normal function of connective tissues through the synthesis of collagen. It also protects cells against oxidative damage caused by free radicals. Deficiency of vitamin C results in scurvy, but symptoms do not appear until deprivation has manifested for 4-6 months.

Table 28 Actual versus recommended intake/safe intake of water-soluble vitamins

Water-soluble vitamins	Mean intake (SD)	Baseline N = 25	Follow-up N = 20
Thiamin (B ₁) (mg/d) ⁵	Actual	1.2 (0.5)	1.5 (1.1)
	Recommended	0.9 (0.1)	0.9 (0.1)
	Difference	0.3 (0.5)	0.6 (1.0)
	P-value (<i>p</i>)	.023	.018
Riboflavin (B ₂) (mg/d)	Actual	1.6 (0.8)	2.0 (1.6)
	Recommended	1.2 (1.0)	1.2 (1.0)
	Difference	0.4 (0.8)	0.8 (1.1)
	P-value (<i>p</i>)	.035	.006
Niacin (B ₃) (mg/d)	Actual	17.6 (7.5)	21.4 (11.6)
	Recommended	15.1 (2.0)	15.1 (2.0)
	Difference	2.5 (7.8)	6.4 (10.8)
	P-value (<i>p</i>)	.124	.016

⁵ Excluded participant at baseline for thiamin only, N = 24

Water-soluble vitamins	Mean intake (SD)	Baseline	Follow-up
Vitamin B ₆ (mg/d)	Actual	1.9 (1.3)	2.0 (1.2)
	Recommended	1.3 (0.1)	1.3 (0.1)
	Difference	0.5 (1.3)	0.7 (1.2)
	P-value (<i>p</i>)	.053	.017
Folate (µg/d)	Actual	262.4 (143.1)	264.8 (146.7)
	Recommended	200	200
	Difference	62.4 (143.1)	64.8 (146.7)
	P-value (<i>p</i>)	.039	.063
Vitamin B ₁₂ (µg/d)	Actual	4.0 (2.3)	4.7 (3.1)
	Recommended	1.5	1.5
	Difference	2.5 (2.3)	3.2 (3.1)
	P-value (<i>p</i>)	< .001	< .001
Biotin (µg/d)	Actual	44.7 (27.3)	48.2 (33.0)
	Range of Actual	17.9-132.8	12.1-134.9
	Safe Intake Range	10-200	10-200
Pantothenic Acid (mg/d)	Actual	5.1 (2.8)	5.4 (2.4)
	Range of Actual	1.5-12.3	2.19-13.0
	Safe Intake Range	3-7	3-7
Vitamin C (mg/d)	Actual	40.3 (26.4)	41.5 (46.6)
	Recommended	40	40
	Difference	0.3 (26.4)	1.5 (46.6)
	P-value (<i>p</i>)	.949	.885

6.5.1.1 Thiamin intakes

The RNI for thiamin among males 19 – 50+ years old was 1.0 mg/day and 0.9 mg/day for males aged 50+ years. The RNI for females 19 – 50+ years was 0.8 mg/day (Department of Health, 1991b). The intake (as a percentage out of 100%) for the general population of 19 – 64 year olds was 163% per day (Bates et al., 2012). Males and females had similar daily thiamin intakes (167% and 160%, respectively). In the current study, the mean (SD) intake of the total group was 1.2 (0.5) mg/day. The daily thiamin intakes of the current group were significantly higher than the thiamin RNI at both baseline and follow-up [$t(23) = 2.437, p = .023$]; $t(19) = 2.591, p = .018$, respectively] (Table 29).

Table 29 Actual versus recommended thiamin (B₁) intakes

Thiamin (B ₁) (mg/d)	Mean intake (SD)	Baseline	Follow-up
Overall		N = 24⁶	N = 20
	Actual	1.2 (0.5)	1.5 (1.0)
	Recommended	0.9 (0.1)	0.9 (0.1)
	Difference	0.3 (0.5)	0.6 (1.0)
	P-value (<i>p</i>)	.023	.018
Males		N = 14⁷	N = 12
	Actual	1.3 (0.6)	1.8 (1.3)
	Recommended	1.0 (0.1)	1.0 (0.1)
	Difference	0.3 (0.5)	0.8 (1.3)
	P-value (<i>p</i>)	.066	.054
Females		N = 10	N = 8
	Actual	1.0 (0.5)	1.1 (0.5)
	Recommended	0.8 (0.1)	0.8 (0.0)
	Difference	0.2 (0.5)	0.3 (0.5)
	P-value (<i>p</i>)	.222	.133

High alcohol consumption can interfere with the body's absorption of thiamin through the intestinal tract and make it difficult to absorb thiamin through foods (Forsander, 1998, Zimatkin and Zimatkina, 1996). Two male participants (8%) were specifically prescribed thiamin due to their alcohol dependence, but only one participant regularly supplemented his diet with additional thiamin. One male participant was an extreme outlier and removed. The mean thiamin intake for males excluding one male participant was 124.7% (14.2) per day at baseline. Males at follow-up had a mean (SD) intake of 172.7% (122.8) per day at follow-up. Females had a mean (SD) intake of 127.1% (60.6) at baseline and 138.4% (64.6) at follow-up. There were no significant differences when separated by sex.

⁶ An extreme outlier was removed from the baseline analysis for the total group

⁷ An extreme outlier was removed from the baseline analysis for the male group

6.5.1.2 Riboflavin (B₂) intakes

The RNI of riboflavin was 1.3 mg/day for males and 1.1 mg/day for females (Department of Health, 1991a). Mean riboflavin intake in both the general population data (171% for males and 164% for females) from the NDNS (Bates et al., 2012) exceeded the RNI.

Table 30 Actual versus recommended riboflavin (B₂) intakes by sex

Riboflavin (B₂) (mg/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	1.5 (0.8)	2.3 (1.4)
	Recommended	1.3	1.3
	Difference	0.2 (0.8)	1.0 (1.4)
	P-value (<i>p</i>)	.339	.027
Females		N = 10	N = 8
	Actual	1.7 (0.8)	1.5 (0.5)
	Recommended	1.1	1.1
	Difference	0.6 (0.8)	0.4 (0.5)
	P-value (<i>p</i>)	.045	.035

The mean (SD) intake at the baseline stage of the current study [115.2% (59.1) for males and 156.1% (71.5%) for females] exceeded the RNI [$t(24) = 2.233$, $p = .035$; $t(19) = 3.119$, $p = .006$, respectively]. Males and females at follow-up also exceeded the RNI at a mean (SD) intake of 177.8% (105.6) and 140.1% (43.7). Males has a significant difference in riboflavin intake at follow-up ($t(11) = 2.547$, $p = .027$) while females had a significant difference in riboflavin intake at both stages [$t(9) = 2.324$, $p = 0.045$; $t(7) = 2.604$, $p = .035$, respectively] (Table 30). In Western countries, dairy products and fortified grain products are a sufficient contribution to riboflavin intake (Powers, 2003). Whole milk, which contains more riboflavin over other types of liquid milk (Daniel and Norris, 1944), was consumed by 17 participants (68%) in the study group on a daily basis.

6.5.1.3 Niacin (B₃) intakes

The RNI for niacin is 17 mg/day for 19 – 50 year old males, 16 mg/day for 50+ males, 13 mg/day for females aged 19-50 years and 12 mg/day for 50+ years old females (Department of Health,

1991a). The general population's intake of niacin exceeded the RNI. Males' mean niacin intake in the general population was 259% and females' intake was 249% (Bates et al., 2012). Males in the current study had a mean (SD) niacin intake of 116.5% (47.8) at baseline and 151.5% (68.7) at follow-up (Table 31). There was a significant difference in males' actual intake and the RNI at follow-up [$t(11) = 2.534$, $p = .028$]. Females in the current study had a niacin intake of 113.0% (37.9) at baseline and 120% (71.3) at follow-up.

Table 31 Niacin (B₃) intakes after adjusting for RNI by age group

Niacin (B ₃) intake (mg/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	19.2 (8.2)	25.0 (11.8)
	Recommended	16.3 (1.4)	16.5 (1.2)
	Difference	2.9 (8.9)	8.5 (11.7)
	P-value (p)	.227	.028
Females		N = 10	N = 8
	Actual	15.2 (5.8)	16.0 (9.3)
	Recommended	13.3 (1.3)	12.9 (.35)
	Difference	1.85 (6.2)	3.1 (9.1)
	P-value (p)	.367	.369

6.5.1.4 Vitamin B₆ intakes

The RNI for vitamin B₆ was reported as 1.4 mg/day for males and 1.2 mg/day for females (Department of Health, 1991a). The general population data from the NDNS reported mean intakes of 190% for males and 160% for females, aged 19 – 64 years (Bates et al., 2012). The current study group also exceeded the RNI for vitamin B₆. The group's mean (SD) intake was significantly greater than the RNI at follow-up ($t(19) = 2.604$, $p = .017$). Vitamin B₆ intake at follow-up for males was significantly different from the RNI ($t(11) = 2.532$, $p = .028$) (Table 32). Intakes for females were not significant at either stage.

Table 32 Actual versus recommended vitamin B₆ intakes by sex

Vitamin B ₆ intake (mg/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	2.1 (1.6)	2.4 (1.3)
	Recommended	1.4	1.4
	Difference	0.7 (1.6)	1.0 (1.3)
	P-value (<i>p</i>)	.110	.028
Females		N = 10	N = 8
	Actual	1.4 (0.6)	1.5 (0.8)
	Recommended	1.2	1.2
	Difference	0.2 (0.6)	0.3 (0.8)
	P-value (<i>p</i>)	.191	.393

6.5.1.5 Folate intakes

The RNI for folate was reported as 200 µg/day (Department of Health, 1991a). The NDNS survey reported folate intakes in the general population that exceeded the RNI [Males = 149%, Females = 115%] (Bates et al., 2012). In the current study, the total group had a mean (SD) intake of 262.4 (143.1) µg/day at baseline and 264.8 (146.7) µg/day at follow-up. The baseline intake was significantly higher than the RNI ($t(24) = 2.183$, $p = .039$). When separated by sex, males and females met the RNI for daily intake of folate. At follow-up, the mean (SD) folate intake for males was 110.4 (151.4) µg/day, 155.1% (75.8) of the RNI. The difference in folate intake at follow-up for males was significantly higher ($t(11) = 2.527$, $p = .028$) (Table 33).

Table 33 Actual versus recommended folate intakes by sex

Folate intake (µg/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	280.4 (43.2)	310.4 (43.7)
	Recommended	200	200
	Difference	80.4 (43.2)	110.4 (43.2)
	P-value (<i>p</i>)	.084	.028
Females		N = 10	N = 8
	Actual	235.5 (98.3)	196.3 (116.0)
	Recommended	200	200
	Difference	35.5 (98.3)	- 3.7 (116.0)
	P-value (<i>p</i>)	.283	.931

6.5.1.6 Vitamin B₁₂ intakes

The RNI of vitamin B₁₂ is 1.5 µg/day for adults (Department of Health, 1991a). From the NDNS data, males and females in the general population exceeded the vitamin B₁₂ RNI (Bates et al., 2012). In the general population, males had a mean intake of 391% and females had a mean intake of 311%. In the current study, the difference between the actual intake and the RNI was significantly higher at both baseline and follow-up [$t(24) = 5.440, p < .001$; $t(19) = 4.573, p < .001$, respectively] (Table 34). The difference between the actual intake and the RNI were significantly higher for males at both stages [$t(14) = 4.872, p < .001$; $t(11) = 4.407, p = .001$, respectively]. Females had a significantly higher intake at baseline and a significantly lower intake at follow-up [$t(9) = 2.686, p = .025$; $t(7) = 3.213, p = .015$, respectively].

Table 34 Actual versus recommended vitamin B₁₂ intakes by sex

Vitamin B ₁₂ intake (µg/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	2.2 (0.6)	3.4 (1.0)
	Recommended	1.5	1.5
	Difference	0.7 (0.6)	1.9 (1.0)
	P-value (<i>p</i>)	< .001	.001
Females		N = 10	N = 8
	Actual	2.7 (0.8)	1.2 (0.4)
	Recommended	1.5	1.5
	Difference	1.2 (0.8)	- 0.3 (0.4)
	P-value (<i>p</i>)	.025	.015

6.5.1.7 Vitamin C intakes

The RNI of vitamin C is 40 mg/day in adults aged 19-64 years (Department of Health, 1991a). The general population data from the NDNS reported adequate intakes of vitamin C for males and females (219% and 210%, respectively) (Bates et al., 2012).

In the current study, females at both baseline and follow-up fell slightly below the recommendation (Table 35). Males at baseline and follow-up met the RNI at 104% (13.5) and 122.2% (37.8). Females at baseline had a mean (SD) intake of 82.5% (23.2), but at follow-up the mean (SD)

intake was well below the RNI, at 76.4% (32.4). None of the mean Vitamin C intake differences were significant at either stage, by the total group or by sex.

Table 35 Actual versus recommended vitamin C intakes by sex

Vitamin C intake (mg/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	42.7 (27.8)	48.9 (52.4)
	Recommended	40.0	40.0
	Difference	2.7 (27.8)	8.9 (52.4)
	P-value (<i>p</i>)	.714	.571
Females		N = 10	N = 8
	Actual	36.8(25.1)	30.6 (36.7)
	Recommended	40.0	40.0
	Difference	-3.2 (25.1)	-9.5 (36.7)
	P-value (<i>p</i>)	.699	.490

6.5.2 Fat-soluble vitamins

Vitamins A, D, E and K are fat-soluble vitamins. Vitamin D is regulated in the body through dermal absorption from exposure to ultraviolet rays in sunlight and RNI only exists for children under four years and adults 65 and over. Vitamin K is not only readily available in various foods such as dark green leafy vegetables, dairy and meat products, but is also synthesized by the intestinal microflora to provide an ample amount in the body. The Vitamin K safe intake for adults is 1 µg/kg/day, but Vitamin K is difficult to measure in foods and was not included in the analysis.

Vitamin A can be obtained in the diet through carotenoids, beta-carotene, derived from plant based sources and retinol in animal based sources. Vitamin A deficiency can lead to night blindness and xerophthalmia – a condition in which the eye is unable to produce tears. Toxicity of vitamin A can occur at extremely high levels but high levels of beta-carotene will not cause toxicity.

Vitamin E is synthesised by plants in the form of two compounds, tocopherols and tocotrienols. Alpha-tocopherol is the most active compound that accounts for 90% of vitamin E in human tissues. Vitamin E is required to protect cells against oxidative damage from free radicals.

Vitamin E deficiency and/or toxicity are not seen in the diet unless through excessive supplementation.

Table 36 Actual versus recommended intake/safe intake of fat-soluble vitamins

Fat-soluble vitamins	Mean intake (SD)	Baseline	Follow-up
		N = 25	N = 20
Vitamin A (µg/d)	Actual	638.7 (350.7)	873.7 (1161.7)
	Recommended	660.0 (50.0)	660.0 (50.0)
	Difference	-21.3 (359.3)	213.7 (1150.4)
	P-value (<i>p</i>)	.769	.416
Males		N = 15	N = 12
	Actual	609.8 (344.9)	1094.3 (1451.6)
	Recommended	700.0	700.0
	Difference	-90.2 (344.9)	394.3 (1451.6)
	P-value (<i>p</i>)	.328	.367
Females		N = 10	N = 8
	Actual	682.0 (373.5)	542.8 (376.0)
	Recommended	600.0	600.0
	Difference	82.0 (373.5)	-57.2 (376.0)
	P-value (<i>p</i>)	.505	.680
Vitamin E (µg/d)	Actual	7.4 (3.9)	6.4 (0.9)
	Range of Actual	1.28 – 18.88	1.69 – 15.87
	Safe Intake Range	> 3	> 3

The RNI of total vitamin A content as retinol equivalents for adults is 700 µg/day. Mean daily intake of dietary vitamin A for males and females in the general population reached 137% and 161% of the RNI. In the current study sample, both males and females at both stages reached the RNI for vitamin A (Table 36). None of the differences in actual intake and the RNI were significant.

The safe intake range of Vitamin E for males and females is > 4 mg/day and > 3 mg/day, respectively (Department of Health, 1991a). In the current study, both males and females intake surpassed the minimum safe intake range at baseline (mean (SD) = 7.8 (4.4) mg/day and 6.8 (3.2) mg/day, respectively) and at follow-up (mean (SD) = 5.9 (4.3) mg/day and 7.1 (3.1) mg/day, respectively).

6.5.3 Minerals

Minerals are inorganic elements that are required for well-being in the human body. Plants are able to acquire mineral elements from the soil through uptake by roots or leaves. Through the consumption of plants or the animals that consume plants, the human body is able to obtain the necessary minerals. However, the phytoavailability of mineral elements and their nutritional quality to plants through the soil determines the bioavailability of those minerals to humans (White and Broadley, 2009, White and Broadley, 2005, DellaPenna, 1999). In the current study, the total group's mineral intake of calcium, phosphorus, sodium, chloride and iodine exceeded the RNI (Table 37). Magnesium, zinc, manganese and copper reached the RNI. Iron, and selenium fell below the RNI.

Calcium is largely found in the bones and teeth in the body. About 1kg or 99% of calcium in the body is found in bones and teeth, approximately 1% of calcium can be found in the soft tissues and intracellular fluids. The calcium RNI for adult males and females is 700 mg/day (Department of Health, 1991a). Magnesium is required for blood glucose control, blood pressure regulation, maintenance of nerve and muscle function. It is also a cofactor for enzymes that regulate biochemical reactions such as deoxyribonucleic acid (DNA) replication and ribonucleic acid (RNA) synthesis. Magnesium deficiency may be a potential risk factor in CVD and diabetes (Song et al., 2004, Abbott et al., 2003, Kao et al., 1999, Ma et al., 1995). Characteristics of magnesium deficiency are muscle weakness, tachycardia, ventricular fibrillation, coma and death.

Dietary iron is available for absorption but depends on the composition of the diet and the type of available dietary iron, (i.e. haem and non-haem iron) (Harvey et al., 2005). Haem iron is a bioavailable form of iron and can be found from animal sources, however non-haem iron can vary widely in different forms of diets as they originate from plant sources. Long-term losses of iron stores in the body and insufficient dietary iron intake can lead to iron deficiency anaemia.

Selenium intake rates among the general population in the UK steadily decreased from the 1970s to the early 2000s (Jackson et al., 2003, Rayman, 1997). Selenium contents in food vary widely due to the soil content and its geochemical makeup where the foods originated. Moreover,

selenium deficiency and its global prevalence are still unknown as the selenium supply varies widely by region and has not been fully investigated. The SACN have indicated that a preventative association potentially exists between selenium and conditions such as cancer, cardiovascular disease, diseases related to thyroid function, reproduction and infertility (Scientific Advisory Committee on Nutrition, 2013, Rayman, 2000, Rayman, 1997).

Table 37 Actual versus recommended intake/safe intake of minerals

Minerals	Mean intake (SD)	Baseline N = 25	Follow-up N = 20
Calcium (mg/d)	Actual	918.4 (66.2)	1110.8 (114.2)
	Recommended	700.0	700.0
	Difference	218.4 (330.8)	410.0 (510.8)
	P-value (p)	.003	.002
Phosphorus (mg/d)	Actual	1182.8 (355.5)	1424.6 (478.0)
	Recommended	550.0	550.0
	Difference	632.8 (355.5)	874.6 (478.0)
	P-value (p)	< .001	< .001
Magnesium (mg/d)	Actual	247.1 (65.8)	293.3 (105.7)
	Recommended	288.0 (15.0)	288.0 (15.0)
	Difference	-40.9 (66.1)	5.3 (100.7)
	P-value (p)	.005	.817
Iron (mg/d)	Actual	10.2 (5.0)	13.6 (8.7)
	Recommended	10.9 (3.0)	10.8 (3.0)
	Difference	-0.7 (6.9)	2.8 (10.4)
	P-value (p)	.631	.244
Zinc (mg/d)	Actual	8.0 (4.3)	9.7 (5.1)
	Recommended	8.5 (1.3)	8.5 (1.3)
	Difference	-0.5 (4.1)	1.2 (4.9)
	P-value (p)	.550	.294
Copper (mg/d)	Actual	1.1 (0.6)	1.3 (1.0)
	Recommended	1.2	1.2
	Difference	-0.1 (0.6)	0.1 (1.0)
	P-value (p)	.653	.570
Selenium (µg/d)	Actual	37.2 (18.8)	31.2 (14.5)
	Recommended	69.0 (7.5)	69.0 (7.5)
	Difference	-31.8 (18.5)	-37.8 (13.6)
	P-value (p)	< .001	< .001
Iodine (µg/d)	Actual	143.2 (82.9)	163.3 (127.6)
	Recommended	140.0	140.0
	Difference	3.2 (82.9)	23.3 (127.6)
	P-value (p)	.850	.425
Manganese (mg/d)	Actual	2.3 (0.3)	2.4 (0.3)
	Range of Actual	0.6 – 5.8	0.9 – 4.7
	Safe Intake Range	> 1.4	> 1.4

6.5.3.1 Calcium intakes

In the current study, the total group's dietary calcium intake exceeded the RNI at baseline and follow-up (918.4 (66.2) mg/day and 1110.8 (114.2) mg/day, respectively) (Table 38). Calcium intake for the group was significantly higher than the RNI at baseline and follow-up [$t(24) = 3.302$, $p = .003$; $t(19) = 3.589$, $p = .002$, respectively]. The calcium intakes for males at baseline and follow-up were significantly higher than the RNI [$t(14) = 2.506$, $p = .025$; $t(11) = 3.354$, $p = .006$, respectively]. Females' calcium intakes were not significantly different from the RNI. Though the group's higher mean calcium intake was significant when compared to the RNI, the body is able to regulate calcium levels through urinary losses and losses through hair, sweat, skin and nails.

Table 38 Actual versus recommended calcium intakes by sex

Calcium intake (mg/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	896.3 (303.4)	1245.3 (563.3)
	Recommended	700.0	700.0
	Difference	196.3 (303.4)	545.3 (563.3)
	P-value (p)	.025	.006
Females		N = 10	N = 8
	Actual	951.6 (382.8)	906.9 (362.2)
	Recommended	700.0	700.0
	Difference	251.6 (382.8)	206.9 (362.2)
	P-value (p)	.067	.150

6.5.3.2 Magnesium intakes

The RNI for magnesium is 300 mg/day for males and 270 mg/day for females (Department of Health, 1991a). When separated by sex, males' magnesium intakes were significantly lower than the RNI at baseline ($t(14) = -2.626$, $p = .020$), but increased to reach the RNI at follow-up (Table 39). The magnesium intakes for females were not significantly different from the RNI.

Table 39 Actual versus recommended magnesium intakes by sex

Magnesium intake (mg/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	251.9 (70.9)	326.4 (108.3)
	Recommended	300.0	300.0
	Difference	-48.1 (70.9)	26.4 (108.3)
	P-value (<i>p</i>)	.020	.417
Females		N = 10	N = 8
	Actual	239.8 (60.3)	243.7 (85.3)
	Recommended	270.0	270.0
	Difference	-30.2 (60.3)	-26.3 (85.3)
	P-value (<i>p</i>)	.147	.410

6.5.3.3 Iron intakes

The iron intakes for the group as a whole were not significantly different from the RNI. However, when separated by sex, the iron intakes for males and females were significantly different from the RNI. For males, iron intakes at both baseline and follow-up were significantly higher than the RNI ($t(14) = 2.649$, $p = .019$; $t(11) = 3.005$, $p = .012$, respectively) (Table 40).

Table 40 Actual versus recommended iron intakes by sex

Iron intake (g/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	12.3 (5.0)	17.0 (9.5)
	Recommended	8.7	8.7
	Difference	3.5 (5.0)	8.3 (9.5)
	P-value (<i>p</i>)	.019	.012
Females		N = 10	N = 8
	Actual	6.9 (3.4)	8.6 (3.9)
	Recommended	14.8	14.8
	Difference	-7.5 (3.4)	-6.1 (3.9)
	P-value (<i>p</i>)	< .001	.015

The RNI for iron is much higher for females than males, taking into account the higher iron demands in the body. The RNI of iron for females is 14.8 mg/day (Department of Health, 1991a). According to the NDNS 2008/09-2010/11, females in the general population from ages 19-64 years were well below the RNI, reaching only 79% (out of 100%) (Bates et al., 2012). In the

current study, females reached 54.1% of their daily RNI. Iron intake was significantly lower than the RNI ($t(9) = -5.510, p < .001$). At follow-up, iron intake for females reached 64.1% of the RNI and was significantly lower ($t(7) = -3.226, p = .015$). Females in the current study may be susceptible to iron deficiency and potentially anaemia; if iron intakes remain low over a long term period, iron stores in the body will be at risk of depletion.

6.5.3.4 Selenium intakes

The RNI for selenium is 75 µg/day, however males and females from the ages of 19-64 in the general population are not reaching their daily intake of selenium (Bates et al., 2012, Department of Health, 1991a). Males obtained a mean of 72% of their daily RNI while females also reached 71% of their recommended intake. In the current study, the group intake was significantly lower than the RNI at both baseline and follow-up [$t(24) = -8.606, p < .001$; $t(19) = -12.431, p < .001$, respectively].

Table 41 Actual versus recommended selenium intakes by sex

Selenium (µg/d)	Mean intake (SD)	Baseline	Follow-up
Males		N = 15	N = 12
	Actual	40.9 (20.4)	35.5 (16.9)
	Recommended	75.0	75.0
	Difference	-34.2 (20.4)	-39.5 (16.9)
	P-value (<i>p</i>)	< .001	< .001
Females		N = 10	N = 8
	Actual	31.8 (15.4)	24.8 (6.3)
	Recommended	60.0	60.0
	Difference	-28.2 (15.4)	-35.2 (6.3)
	P-value (<i>p</i>)	< .001	< .001

In the current study, selenium intakes for males and females at both baseline and follow-up were well below the daily RNI (Table 41). Males at baseline obtained a mean (SD) daily intake of 54.5% (27.3) and at follow-up, the intake fell well below the RNI at 47.3% (22.5). Females also had low intakes of selenium, a mean (SD) intake of 53.5% (25.0) at baseline and 41.3% (10.8) at follow-up. The difference in selenium intake compared to the RNI was significant for males at baseline and follow-up [$t(14) = -6.486, p < .001$; $t(11) = -8.095, p < .001$, respectively]. Females

also had a significantly lower intake than the RNI at baseline and follow-up [$t(9) = -5.778$, $p < .001$; $t(7) = -15.738$, $p < .001$, respectively]. Long-term health implications may arise from extended periods of low level serum selenium, however further studies must be conducted to investigate lowered selenium status (Brown and Arthur, 2001).

6.5.4 Electrolytes

Potassium is necessary in the body for the structure and function of cells. Blood pressure is also associated with potassium as a sufficient potassium intake promotes sodium excretion in the urine by acting as a diuretic, thus aiding in the decrease of blood pressure (Treasure and Ploth, 1983). Potassium is present in foods such as bananas, vegetables, meat, shellfish, legumes, seeds and nuts. Potassium deficiency can result in hypokalaemia - low blood levels of potassium, mental depression and confusion.

Sodium regulates body water content and the balance of electrolytes. Higher levels of dietary sodium can lead to elevated blood pressure levels and incidences of hypertension and stroke. The combination of a high sodium diet, obesity and high alcohol intake are the major risk factors to hypertension, stroke and CVD.

Dietary intake of chloride is derived from sodium chloride. There is evidence that sodium and chloride interact together to increase arterial pressure in the body (Boegehold and Kotchen, 1991, Kurtz and Morris, 1983). Dietary intake of chloride matches and is also interdependent with sodium. The RNI for chloride is 2500 mg/day (Department of Health, 1991a).

Table 42 Actual intake versus recommended potassium intakes

Potassium (mg/d)	Mean intake (SD)	Baseline	Follow-up
Overall		N = 25	N = 20
	Actual	2523.2 (995.3)	2925.9 (1204.5)
	Recommended	3500.0	3500.0
	Difference	-976.8 (995.3)	-547.1 (1204.5)
	P-value (<i>p</i>)	< .001	.046
Males		N = 15	N = 12
	Actual	2696.2 (909.6)	3470.7 (1175.1)
	Recommended	3500.0	3500.0
	Difference	-803.8 (909.6)	-29.3 (1175.1)
	P-value (<i>p</i>)	.004	.933
Females		N = 10	N = 8
	Actual	2263.7 (1109.0)	2108.6 (704.0)
	Recommended	3500.0	3500.0
	Difference	-1236.3 (1109.0)	-1391.4 (704.0)
	P-value (<i>p</i>)	.006	.001

The RNI for potassium was set at 3500 mg/day (Department of Health, 1991a) [see Table 42]. The NDNS reported lower mean intakes of potassium in the general population (Bates et al., 2012). In the general population, males had a mean intake of 88% and females had a mean intake of 72%. Potassium intakes in the current study sample were also well below the RNI. Males at baseline had a mean (SD) intake of 77% (25.9) which was significantly lower than the RNI ($t(14) = -3.422, p = .004$). At follow-up, the potassium intake for males met the RNI at a mean of 99.3% (33.4). Females did not meet dietary potassium sufficiency. Females at baseline had a mean (SD) intake of 71.3% (24.5) and at follow-up; the mean (SD) intake was 60.1% (20.2). Females' potassium intakes were significant lower than the RNI at both the baseline and follow-up stages [$t(9) = -3.525, p = .006$; $t(7) = -5.590, p = .001$].

6.5.4.1 Salt (sodium and chloride) intakes

The RNI suggests 1.6g of sodium as a sufficient intake for the dietary needs of more than 95% of the population. Due to the high intake of salt in the UK in 1991 (it was approximately 9 g/day), the maximum recommended salt intake per day was reported as 6 g/day for adults (Department of Health, 1991b). In the NDNS survey of dietary sodium in England, the general population data reported a higher intake of daily salt intake for both men and women. Males had a mean

estimated daily salt intake of 9.3 g/day and females had a mean estimated daily intake of 6.8 g/day (Sadler et al., 2011). In the current study, both males and females at baseline and follow-up exceeded the RNI for sodium (Table 43). Males had a mean daily estimated salt intake of 7.6g at baseline and females had a mean daily estimated salt intake of 5.8g. For sodium intake, males significantly exceeded the sodium RNI at both baseline and follow-up [$t(14) = 4.884$, $p = < .001$; $t(11) = 3.885$, $p = .003$, respectively]. Females' sodium intake also exceeded the RNI at baseline and follow-up [$t(9) = 2.725$, $p = < .023$; $t(7) = 3.365$, $p = .012$, respectively].

Table 43 Actual versus recommended sodium intakes by sex

Sodium (mg/d)	Mean intake (SD)	Baseline	Follow-up
Overall		N = 25	N = 20
	Actual	2476.9 (1061.4)	3346.4 (1808.3)
	Recommended	1600.0	1600.0
	Difference	1146.9 (1061.4)	1746.4 (1808.3)
	P-value (p)	< .001	< .001
Males		N = 15	N = 12
	Actual	3014.7 (1121.8)	3940.8 (2087.1)
	Recommended	1600.0	1600.0
	Difference	1414.7 (1121.8)	2340 (2087.1)
	P-value (p)	< .001	.003
Females		N = 10	N = 8
	Actual	2345.3 (864.9)	2454.8 (718.5)
	Recommended	1600.0	1600.0
	Difference	745.3 (864.9)	854.8 (718.5)
	P-value (p)	.023	.012

At follow-up, males had a mean estimated salt intake of 9.8 g/day and women had a mean estimated salt intake of 6.3 g/day. Intake analysis for males and females were significantly greater than the RNI at baseline and follow-up. Males in particular, exceeded the general population's mean estimated salt intake; both groups reflected a similar salt consumption trend to that of the general population. There is a greater need for a reduction in salt intake in both the general population and in the current study sample to meet the maximum recommended intake of 6 g/day.

Table 44 Actual versus recommended chloride intakes by sex

Chloride (mg/d)	Mean intake (SD)	Baseline	Follow-up
Overall		N = 25	N = 20
	Actual	3870.0 (1340.2)	4613.3 (2533.8)
	Recommended	2500.0	2500.0
	Difference	1370.0 (1340.2)	2113.3 (2533.8)
	P-value (<i>p</i>)	< .001	.001
Males		N = 15	N = 12
	Actual	4184.8 (1449.1)	5445.4 (2878.4)
	Recommended	2500.0	2500.0
	Difference	1684.8 (1449.1)	2945.4 (2878.4)
	P-value (<i>p</i>)	< .001	.005
Females		N = 10	N = 8
	Actual	3397.9 (1053.6)	3365.2 (1199.9)
	Recommended	2500.0	2500.0
	Difference	897.9 (1053.6)	865.2 (1199.9)
	P-value (<i>p</i>)	.025	.081

As with sodium levels, mean (SD) chloride intake of the total group exceeded the RNI [3870.0 (1340.2) mg/day and 4613.3 (2533.8) mg/day] at baseline and follow-up (Table 44). Males' chloride intake was significantly higher than the RNI at both baseline and follow-up [$t(14) = 4.503$, $p < .001$; $t(11) = 3.545$, $p = .005$, respectively]. Females had a significant difference in chloride intake at baseline [$t(9) = 2.695$, $p = .025$]. The total group's higher consumption of salt increases the risk of CVD.

6.6 Nutrient intake and alcohol

6.6.1 Sources of energy separated by alcohol consumption and alcohol abstinence

Alcohol misuse was prevalent in the group and an analysis of sources of energy was conducted to first explore the variation in energy intake by separating the groups by alcohol intake. In the current study, heavy alcohol drinking and binge drinking occurred among seven respondents (28%) at baseline. At follow-up six respondents at both baseline and follow-up drank on a daily basis (24% and 30% respectively) and above the UK recommended drinking limits.

Energy intake of the participant group was also separated into two categories: the alcohol consumption group and the alcohol abstinent group. At the baseline stage, eleven males and four females consumed alcohol during the five 24HR. Ten males and three females made up the alcohol consumption group at follow-up. The total energy intake recommendation for the general population, adjusting for alcohol consumption is: 5% alcohol, 15% protein, 33% fat and 47% CHO (Department of Health, 1991a). The energy intake of the alcohol abstinent group was similar to the RNI. Recommended total energy intake for the general population, adjusting for alcohol abstinence is: 15% protein, 35% fat and 50% CHO (Department of Health, 1991a).

The NDNS reported that adults in the general population from 19-64 years obtained 9% of their energy intake from alcohol (Bates et al., 2012). According to Figure 15, the alcohol consumption group in the current study had a larger variation in sources of energy than their abstinent counterparts. The mean (SD) total alcohol intake was 21.4% (16.4), exceeding the recommendation and the general population data. The mean (SD) total protein intake was 10.6% (3.5). The mean (SD) total fat intake was 29.2% (7.4) and the mean CHO intake was 36.7% (11.7).

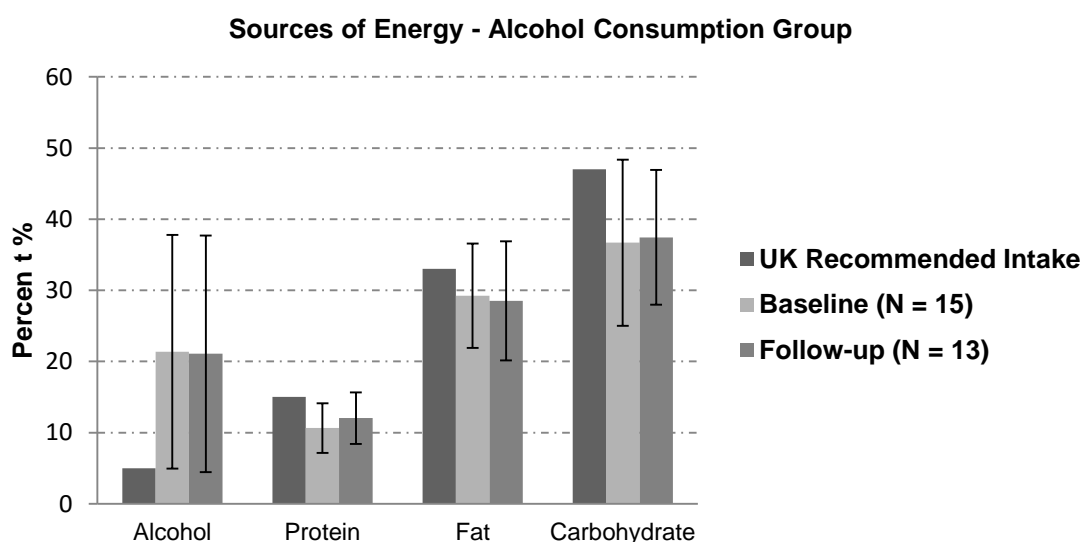


Figure 15 Energy intake comparison of the UK general population alcohol consumption group at baseline (n = 15) and follow-up (n = 13)

At follow-up, the energy intake for the alcohol consumption group was lower than the UK recommended intake. However, the alcohol consumption of the group varied widely with a mean (SD) percentage of energy at 21.1% (16.6). Compared to the baseline stage, the energy intake of the alcohol consumption group at four months was similar. Overall, compared to the general population, the alcohol consumption group received a larger amount of calories from alcohol which contributes to energy, but may be nutrient deficient due to the inadequate consumption of nutrients overall.

The energy intake for the alcohol abstinent group was 13.1% (2.7) for protein, 35.2% (4.4) for fat and 51.1% (3.9) for carbohydrates (Figure 16). The similarities were in contrast to the alcohol consumption group which suggested a more stable dietary intake pattern.

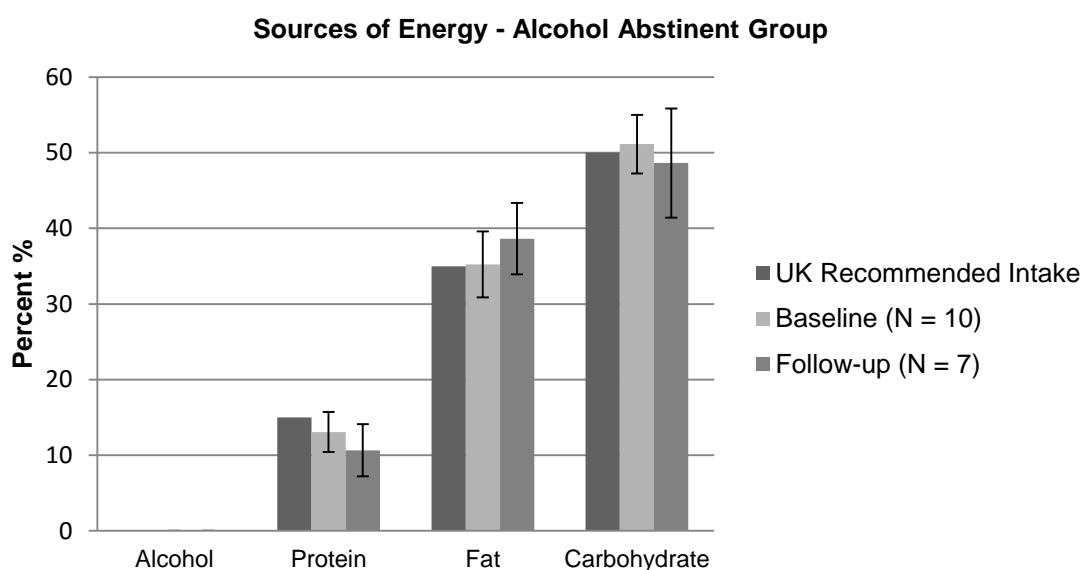


Figure 16 Energy intake of the alcohol abstinent group at baseline (n = 10) and follow-up (n = 7)

The energy intake for the alcohol abstinent group differed at the follow-up stage. Compared to baseline, the mean (SD) energy intake from fat increased above the UK general population's

intake to 38.6% (4.7). Protein intake decreased to 10.0% (3.4) and CHO intake decreased to 48.7% (7.2).

6.6.2 NMES intake between alcohol consumption and alcohol abstinent groups

CHO intake was broken down to analyse the intake of sugars. The DOH has proposed a maximum recommended NMES intake of 10% (including alcohol) and 11% (excluding alcohol) of total food energy per day (Department of Health, 1991a).

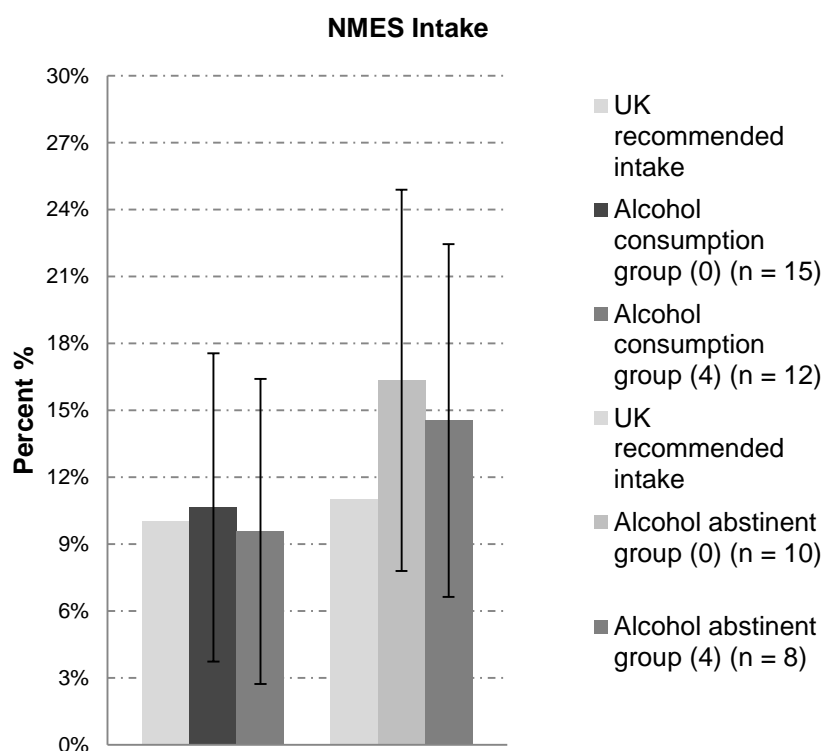


Figure 17 NMES intake grouped by alcohol consumption status at baseline (0) and follow-up (4)

According to Figure 17, the mean percentage of NMES to total energy contribution was separated by the corresponding recommended intake and the current group's alcohol consumption. The alcohol consumption group and the alcohol abstinent group both exceeded the recommended

NMES intake. The alcohol abstinent group in particular was approximately 5% higher than the DRVs. According to the NDNS from 2008/9-2010/11, all of the surveyed children and adults ($N = 3073$) in the general population exceeded the NMES intake recommendation (Bates et al., 2012). Adults 19-64 years obtained 12.3% of their energy intake from NMES.

In contrast, the alcohol abstinent group in the current study exceeded even the highest general population figure. The alcohol abstinent group's NMES intake contributed 16.3% (8.6) to total energy while the highest general population figure from the NDNS was 15.3% in 11-18 year olds. NMES intake at the four month follow-up slightly decreased from the baseline results. The alcohol consumption group reported a mean (SD) total of 9.6% (6.9) and the alcohol abstinent group reported a mean total of 14.5% (7.9). The alcohol abstinent group remained higher than the UK recommended intake and the general population average (11 and 12.3%, respectively).

An excess intake of NMES can contribute to weight gain if energy intake exceeds energy expenditure over time. Furthermore, the diet (of the OST participant group or otherwise) may not be as nutritious by excessively consuming, on a regular basis, a nutrient limited source such as NMES on a regular basis (Health Education Authority, 1999). Although CHO intake of the alcohol abstinent group appeared to coincide with the RNI, this obscured the high fractional contribution of NMES. Fourteen to sixteen percent of the alcohol abstinent group's total carbohydrate intake originated from NMES. With a greater intake of NMES as compared to other carbohydrates over time, the group's varied sources of nutrients may become relatively limited.

6.7 Overview

Participants' nutritional and health status is extremely complex due to numerous corresponding factors that only increase the difficulties to understand their overall physical health. Overweight and obesity are prevalent among the participants in the current study. High rates of BMI over the normal range and high body fat percentage were all features among a large number of participants; a majority of the females in the study reported higher rates. Risks to health may occur through obesity-related morbidity in the long-term.

In general, the current group showed overall nutrition status in line with the general population, although it varied significantly on a subject to subject basis. Energy intake and macronutrient intakes were sufficient, except NSPs. Intakes below the RNI were also observed in the general population, but may be a significant issue among the current study group since their NSP intake is well below that of the general population. Water and fat-soluble vitamins were all above or in line with the RNI. Among the minerals, magnesium, potassium and selenium were below the RNI, although the same is true of potassium and selenium intakes in the general population. Sodium intake was high, in line with the general population. Iron intake was below the RNI among the females in the group, which was in line with the general population; however, the iron intakes among females in the current study were well below the general population findings.

A significant proportion of the current group were misusing alcohol. These subjects were obtaining a large proportion (approximately 20%) of their energy from alcohol, leading to below recommended proportions of other food types and groups. The alcohol consuming subgroup also showed a large degree of variance in energy intake from other food groups, suggesting a more erratic eating schedule.

Chapter 7 Dietary behaviours from childhood to OST

7.1 Introduction

As humans we require food to survive, but eating rituals have created complex food consumption methods that surpass a basic necessity for survival. Eating together as a family has social significance that teaches children about etiquette and table manners, while the importance of eating is reinforced by promoting communication through conversation. As children, we are exposed to foods to gain an understanding of what is considered edible; we then retain the knowledge of these foods into adulthood. We can then discern our personal tastes for foods and obtain a balance of our likes and dislikes through our experiences.

The first step to children's food knowledge is through the family. Parents play a significant role in teaching their children about foods, eating rituals and etiquette, but the traditions and manners that are passed from parent to child are centrally connected to the parents' own knowledge and awareness. Food consumption rituals in the family household are just as important as parent-child bonding to promote health and well-being. Eating together as a family and the preparation of meals at home are associated with a lower risk of childhood obesity (Fulkerson et al., 2006). Dinner rituals may also influence both the parent and child's BMI. Wansink and van Kleef (2014) reported that families who ate together in the kitchen or dining room reported a lower BMI than families who ate elsewhere. Children who ate family meals in the home had a higher nutritional intake through an increased consumption of vegetables and fruit and decreased consumption of carbonated beverages and saturated fat (Larson et al., 2007).

This chapter explores childhood food consumption of the current study group to gain a broader understanding of the family environment, food preferences, dinner rituals and childhood weight. Participants' food acquisition and consumption are also investigated during transitional phases - adolescence and early adulthood. Finally, participants' periods of heavy drug consumption may be associated with any new food consumption and acquisition patterns. These patterns may

influence participants' food consumption and lifestyle patterns while receiving OST. Any previous digestive health issues may provide further insight, particularly during periods of heavy drug consumption and connections to their current digestive health.

7.2 Influential factors during childhood

7.2.1 Food preferences

Several participants mentioned that they were happy to eat most foods and ate everything on their plates when they were children. Participants with positive food experiences were also willing to try new foods. Delia, as mentioned earlier, recalled her experience with foods:

"I love veg, fruit and potatoes. I was never picky about anything. I always...tried it and if I didn't like it, fair enough. But I always made sure I tried something before I could say I didn't like it."
(Delia, Age 33)

Fussy eating and food neophobia were reported by many participants. Vegetables were particularly loathed, and a number of participants reported a dislike of offal, meat or fish. Two participants stated that they picked at food due to having a smaller appetite or feeling bored of constantly eating similar types of foods. Kurt described his difficulty with portion sizes of meals and picking at foods:

"I've never been a big eater anyway. I never ate large portions. I used to pick and eat. I ate smaller portions more frequently. Than sitting down to a great big plateful like my brother did...Sometimes if they overloaded the plate, just looking at it made me feel full. You feel full before you even started something. I just...I wouldn't eat it...Maybe trouble it a bit later, have a bit later on and then the rest it would go in the bin." (Kurt, Age 49)

Participants who reported food neophobia were particularly averse to foods that were described as 'foreign' or 'alien' and reported more erratic food consumption. Two participants in particular, emphasised their experience with food neophobia and erratic eating due to childhood trauma. Carmen, who experienced severe neglect in the home as a child, had difficulty with exposure to foods later in her youth:

"Say if it was beans, and the sauce had touched any other food, I wouldn't eat the food that it touched. Basically it would be things like chips...I wouldn't really eat meats cos you know...unless it was like chicken, I knew chicken. Say if there was any food that was like alien to me, if I didn't know what it was, I wouldn't eat it. It'd be like potatoes - that was all fine. And then things like sweet corn and runner beans and stuff - it was okay. But if you gave me a carrot or a sprout, I didn't know what it was then...I wouldn't eat it." (Carmen, Age 22)

Elise who was affected by sexual abuse experience as a child, began to develop an inability to ingest solid foods completely. She developed a severe dislike of foods being caught on the roof of her mouth or at the back of her throat:

"I was a fussy eater apparently when I was smaller. I was only living on yogurts up to the age of about 16... I was just a yogurt person. I wouldn't eat basically - no chips, no meat, no vegetables, no bread, no cereal, no nothing... From the age of 16, that's when I started trying different kinds of food. But then, something [trauma] happened and then I stopped eating solid foods for a few years... When I was 16 as well, on certain occasions my food had to be blended up. It's the same as now really. Depending on what I'm having, my food has to be blended up as well." (Elise, Age 34)

7.2.2 Hot meals and home cooked food

Many participants commented on having hot meals and homemade meals when they were children. For most participants, the maternal figure in the household mainly took responsibility for the cooking and duties in the kitchen. Several participants spoke fondly of their mothers' cooking and reflected with warmth as they described the foods their mothers cooked. Participants who had fond memories of the cooking they experienced during their childhoods used descriptions such as 'fresh food', 'good food' and 'balanced diet'. Distinctions were made between meals that were entirely homemade and meals that were fast, processed or frozen. Brandon, whose mother passed away when he was 21 years old, described the fresh and homemade meals his mother cooked for the family:

"She [Mum] never used to make packet stuff. She used to make things from scratch like shepherd's pies, lasagne...cottage pie, cheese and potato pie. Things like that she'd do every day. She'd never buy something in a packet. It was always fresh food." (Brandon, Age 40)

Fathers, stepfathers and grandparents also cooked for the children or helped mothers cook family meals. A number of participants reported both parents worked together to cook meals or grandparents cooked meals for the family.

Delia described how her grandmother not only cooked for the family, but also watched over and cared for the family:

"I was at my Nan's and she was doing like three meals a day. They'd be home cooked meals... She would take good care of my health and every time I went to see her when I weren't living there, she would make sure I was well-looked after." (Delia, Age 33)

Two participants experienced particularly poor eating habits and a lack of home cooked meals in the family home during their childhoods. For both participants, their mothers thought school dinners were sufficient and did not cook during the weekdays. Descriptions such as 'hungry' and 'poor' were used when they were asked about their childhood impression of food and meals. Carmen described having to eat at other people's homes because her mother would not to cook for the family at all:

"We'd have it [cooked meals] if we went to friend's houses, like we'd have hot meals there. We had someone who lived down the road from our mum and she had five kids. And she would usually cook food for them. Sometimes if she had extra she would call us and we would go down and have that. And when I went to my Nan's, she would cook. Then my dad's mum, she would cook for us. Maybe [a hot meal] once or twice a week if we were lucky. It'd depend. And then in the summer holidays we would get nothing like that because we weren't at school [to have school dinners]." (Carmen, Age 22)

Karen reported feeling so hungry in the evenings she tried to cook for herself at the age of approximately ten:

"During the week, we were left up to our own devices really. To the point where I cooked some...I thought I cooked some pork sausages. I used to put them under the grill for about 20 seconds and then eat them. And I got worms." (Karen, Age 51)

7.2.3 Drinks consumption

Participants consumed fizzy drinks, squash, water and fruit juices. Several participants reported that fizzy drinks and squash were considered a reward or a luxury, and were available once per day. Participants also drank milk and hot drinks such as coffee and tea. A small number of participants described drinking alcohol from a young age, starting as young as ten years old. Brad experienced sexual abuse in the home by his mother's partner and began abusing alcohol at ten years old, around the same time as the traumatic event:

"[Mum's partner], he's not like an abuser...but he used to stick me in the back room from when I was 10, until I was 11 years old. He would stick me in the back room and he used to rape me. Well, he didn't rape me, the other people used to rape me and he would get money for that. [Interviewer asked about what he drank as a child] Juice, tea, I mean alcohol, back then...Nearly 10 or 11 years old I was drinking." (Brad, Age 26)

Dinner was viewed by several participants as an obvious and straightforward ritual that one attended; there was no choice. Eating together occurred either around a dinner table or gathered together in front of the television. Many participants reported eating together as a family every day or at the weekends. Some participants emphasized the importance of sitting around a table to eat as a family. Harry, who grew up in an era when microwaves were not a standard appliance in the home, described dinner with the family:

"You had to eat at the table....at dinnertime. You had to eat together on the Sunday. Cos we didn't have microwaves and things like that. Because you didn't want your thing to go in the oven...it will go all dry and horrible. You made sure you was home anyway. Or you get a bollocking if you didn't, you know what I mean. If dinner was set, we all sit at the table." (Harry, Age 47)

7.2.4 Dining experiences

During childhood, several participants commented that eating together was regarded as an important time, particularly on a Sunday when the Sunday roast was served. Two participants stated that eating together was also about table manners and etiquette. Irene recalled the importance of family togetherness and reflected on family values:

"Both my mum and dad, and grandma. They were all fussy. You didn't eat at a table, you didn't have a straight enough back. You weren't allowed to slouch or anything...Had to say grace and everything. To be honest, when I look back on it, I wish I still do it now. I really do. But we all grow out of things..." (Irene, Age 28)

Several participants commented that eating dinner while watching TV and sitting on the sofa was more relaxing than sitting at the dinner table. Sherman, whose parents were divorced and his mother was often busy with work, also mentioned not always having a dining table in the house:

"My mum was busy cos she was working. Basically she fit it into a time when she knew we were all going to be in the house...which would normally be around 5, half 5 in the evening, by late afternoon. We didn't always have a dining table either. We used to sit on the sofa a lot so we can relax. We used to watch telly as well." (Sherman, Age 44)

In contrast, some participants described negative eating experiences that affected food consumption and dinner rituals with the family. For example, participants described domestic abuse, sexual abuse and/or neglect in the home. Dana had difficulty processing her parents' divorce and accepting her new stepfather into the family as she recounted eating at the dinner table:

"I had to sit down [at the dinner table] with just my stepfather and my mum and my sister. Which was not good...And they had two exchange students from Russia or somewhere like that, I don't know...All I wanted to do was go. I didn't want to sit with them at all...I didn't like it at all. I just wanted to be alone, in my room on my own." (Dana, Age 29)

Ted described the domestic abuse experienced in the family home and changes in the family's food consumption pattern:

"For my childhood I had problem with my parents. They argue and sometime I went to stay with my grandma. Because my father was taking alcohol and beating my mom. That's why sometimes we're not eating healthy food, proper food. Because we're at people's houses, family houses to my mom. It's not our house." (Ted, Age 38)

Elise was sexually abused by members of her family. The trauma drastically changed her thoughts of food, connecting her thoughts of what was defined as 'dirty' and 'clean' in her mind. She began to view the physical state of foods as dirty and clean. According to the length of the digestion process and the length of time food remained in the body, Elise modified her food consumptions patterns to maintain a level of cleanliness that was necessary for her to function:

"When I was young...I basically got sexually abused by a member, well, two members of the family. When that happens to you, you carry that around in your head for so long...Everybody who's been sexually abused thinks basically that they're dirty on the inside...Solid food just like, sits inside you for a few days. For me, that was making me feel dirty. So I thought if I have liquidated food like a yogurt, it'd just go straight through me and wash my insides out." (Elise, Age 34)

7.2.5 Household food budgets

Several participants in single parent households reported that their parents, in most cases mothers or grandmothers, had to cook on a strict budget to provide for the family. Parents with financial difficulties tended to purchase processed, frozen or tinned foods in order to provide for

their children. Laura, whose family lost their home due to a fire and moved into her grandmother's flat, spoke of her mother's difficulties to feed the family:

"It was difficult to try and get food on the table and things like that...Um, sometimes it was a lot of frozen stuff or tinned stuff - whatever was cheap and easy. And sometimes we had fruit. I don't remember it often, to be honest." (Laura, Age 24)

A small number of participants recalled their parents' budgeting and cooking methods in a clever, innovative way. Oscar recounted how his mother was able to afford food on a restricted budget:

"She [Mum] was always cooking...Whenever we go in there [kitchen] we'd smell cooking going on...She'd use cheaper cuts of meat and that, but she'd make homemade faggots. She was a brilliant cook and that." (Oscar, Age 53)

7.2.6 Children's residential homes and young offender institutions

Several participants reported spending time in children's residential homes or a young offender institution while they were young. Stays in either environment tended to last for years. Wendy was in 28 children's residential homes over the first four years of her life. Wendy expressed powerlessness to change her situation due to the rules of the care home operator who was in charge of her meals:

"Awful food, cos I don't eat meat...You ate what you were given. Um, so ham sandwiches for school. And I wouldn't eat that for lunch. Or corned beef or haslet... So I wouldn't eat that. And then sausage, chips and beans...I would hide it in a tissue and try to flush it without being spotted. So, I didn't really eat cos it was awful food." (Wendy, Age 41)

Young offender institutions offered the opportunity to acquire skills and vocational training. Two participants learned to cook in the kitchens due to their long stays in the young offender institution. As they gained more experience cooking, they also climbed the ranks in the kitchen. Oscar learned kitchen skills while in the young offender institution:

"I was a qualified chef when I come out of there. It wasn't on paper, but I knew how to do everything. I basically cooked and worked grills...I know how to bake bread and bake rolls and bake cakes. I was a qualified chef. I ended up being number 2 in the kitchen. There was a kitchen with about 25 blokes in there. I was the one in charge and I was the youngest in there." (Oscar, Age 53)

7.2.7 Experiences with weight

Several participants described themselves as overweight children. Lance described his lifestyle as unhealthy in general, eating snacks and drinking fizzy drinks at home and school. He explained that his experience with food during his childhood stemmed from his parents' eating patterns:

"I think it was just comfort food really. When you're a kid, what they would call comfort food now...I don't remember if it was anything healthy because she [mum] used to have to cook dinner for me father as well, do you know what I mean. And he wouldn't eat salads or pasta or any of that sort of stuff. He was just like chips and meat and that." (Lance, Age 36)

Karen, who was noted earlier, described her own mother's issues with weight and diet, and how these issues affected the quality of food in the household. Karen struggled with her weight as a child and felt so hungry she began raiding the freezer for food. She described her eating experiences in further detail:

"She [Mum] was dieting a lot. She was always struggling...to keep her weight down...Yes, she was taking all these slimming aids, you know...So it wasn't very good food...But I do remember going and raiding the freezer quite a bit. Everything was like, melon balls, big things of ice cream and croqueed potatoes. They were disgusting. She used to get lots of this cheap stuff from Iceland. In the end she had to put a padlock on the freezer cos I was eating too much." (Karen, Age 51)

Several participants also commented on being underweight, hungry and malnourished as children. One participant had a reduced appetite and picked at food or felt full seeing lots of food on a plate. Wendy reflected on her appetite and physical size as a child:

"I was hungry all the time. So hungry...I had an appetite but didn't eat cos it [meals] was horrible...I was like a little waif, I was very tiny. I did have an appetite. I liked vegetables. I loved potatoes. You know, things that children usually shy away from, like sprouts. I would just eat till the cows came home if I was given the opportunity. So like I say, before I got on the um, drugs, I preferred potatoes and things to puddings." (Wendy, Age 41)

Carmen recalled the actions taken by school staff and Social Services to investigate malnutrition in the home:

"Junk. Literally. She [Mum] would buy, if she went shopping, she would buy crisps and chocolate and stuff...that would keep our weights up so nobody would know what was going on. Cos we had Social Services report us and stuff. The school was reporting that we were malnourished and so was our doctor. But when they would see her, she would say, "Well, look at them, they all look like a normal weight so they can't be malnourished"...It was because she fed us full of shit. Literally it was crisps, chocolate and toast. It was always... "Go eat some toast if you're hungry." (Carmen, Age 22)

7.3 Influential factors after moving out of the family home

Several participants reported erratic food consumption during transitional phases in adolescence and early adulthood. In particular, a number of female participants reported more erratic food consumption behaviour and eating disorders after becoming independent from the family. One male participant and several female participants stated that psychological issues affected their daily eating patterns. Elliott became addicted to alcohol at the time and used alcohol as a source of nutrition:

"Quite bad. Up till I was 29, it [eating] was bad. My eating was very minimal...I'd maybe have something to eat once - a meal, a hot meal, maybe in a restaurant once a week. I would get all the nutrition from alcohol. Because there's a lot of nutrition in alcohol, lot of vitamins and stuff like that. Helped keep me going. I know it was wrong, but didn't feel like eating anything, basically." (Elliott, Age 46)

Participants used descriptors such as 'obsessive' and 'due to depression' to explain consumption patterns. Two participants described their eating behaviour as obsessive. Kyle, who was admitted to a private hospital for schizophrenia, became obsessed with eating due to the side effects of his medication:

"In the private hospitals I would have cereal, a fried breakfast and yoghurt. At 11, I would have cake and tea and coffee and biscuits. Then at 12 and 1 o'clock I'd have a meal, not like a lunch but a meal with pudding. Come three or four o'clock I would have tea and cake and biscuits. Then at five and six o'clock I would have another meal with pudding. Then at eight o'clock I would have sandwiches... There was nothing else to do but eat. These [mental health] medications...they make you feel hungry. It doesn't matter how much you eat, this hunger just doesn't go away. It's like you can't be satisfied, you know. It was one of the side effects... It's made my eating obsessive sometimes." (Kyle, Age 34)

Carmen became obsessed with her caloric intake and constantly maintained a mental record of calories over the course of the day:

"Yeah, it was just like everything I ate I would keep a mental track of the calories. All the time. I wouldn't let myself go over. But at that point, I wouldn't particularly eat a lot anyway cos I was using. So it was never, it wasn't very often an issue...If I knew I was up to my limit and on the occasion I went out and had like a full meal or something, I would really struggle with eating that meal." (Carmen, Age 22)

Two female participants reported binge eating and anorexic tendencies during their youth. Irene suffered a miscarriage at 14 years old and was unhappy in her living situation. She reported that her food consumption behaviour was affected by her emotional state at the time:

"When I left school at 14...I went either to my best friend's house or at the time, my boyfriend's house. I wouldn't really eat...I could go a couple of days to a week without eating. Long as I had some water or something there. I'd be all right. I wouldn't need food...Sausage rolls and easy snack things like that." Mainly cakes and crisps. (Irene, Age 28)

After initial periods of independent living, several participants began to develop other erratic food consumption behaviours. Participants reported obsessive eating and drinking. Carmen started working, she began drinking Coca-cola and Diet Coca-cola:

"I couldn't have fizzy drinks as a kid. They used to make me really sick. And then it's something that I just got a tolerance to. And then when I first started work, it was the biggest deal for me to be able to go and buy a bottle of Coke. And it just sort of spiralled from there and something that I just do because I can. And I love it. But I only ever used to drink Diet Coke." (Carmen, Age 22)

Theodore described how his alcohol consumption displaced his meals:

"...I was drinking a lot so basically I started to eat a lot less because you get you get your calories from alcohol. And you're feeling hung over and ill, you just don't want to eat, do you...I was strung out, getting a bit shakier and shakier all day. I finish work and instead of going and cooking a meal, I head to the pub. I might eat some peanuts or something." (Theodore, Age 37)

Wendy reported bingeing tendencies after her living situation stabilised:

"I settled down with my eldest son's father. And then obviously there was more money. So, I ate better. But I tended to binge then... I would put everything in a sandwich, with cheese and peanut butter with mayo, plus the salad so it was actually disgusting. But I put it all in in case...it wasn't there later, I wish I had it. The food, if you know what I mean. So I did used to binge for ages. Not to be sick, but to eat it." (Wendy, Age 41)

One female participant had a reduced appetite after her husband passed away and stopped cooking homemade meals, instead choosing to buy takeaways. Two female participants developed body image dissatisfaction and began to starve themselves to reduce their body weight. Karen experienced anxiety when under stress which directly affected her food consumption patterns and eventually her weight:

"I was buying plastic bags of biscuits and eating them all in one go. So I did get quite overweight. And...other volunteers commented on it. How pretty I was and what a shame it was that I was fat, you know. I wasn't that fat. When I look back, I was actually only 12 stone. And I'm 12 and half stone now. But when you're 19, if you're overweight, it's like a big issue because it looks so important at that time in your life...I was eating, controlling my eating. I would have scheduled times when I would eat. And I would eat the right food and it was all under control. But if there was any pressure brought in like a job or nursing, it just pushed me over the edge and I just start eating willy nilly." (Karen, Age 51)

Elise, who blended all of her foods as she was unable to ingest them due to traumatic issues, subsequently began to develop body image dissatisfaction issues during adulthood. She began to fast for days during the week and extensively fasted for three months:

"When I was about, it was about two years ago actually. I starved myself for about three months. Because...I noticed within myself every time I looked in the mirror, I felt like I was fat, so I starved. I just thought, basically, when I looked in the mirror that I was too fat. And doing exercise is not going to lose it. So I thought if I starve myself and live off my own body fat, then I would lose it that way." (Elise, age 34)

7.3.1 Food acquisition

After moving out of the family home, the participants' food acquisition methods depended strongly upon their living environment. The facilities where participants lived varied: social housing, remand centres, military, prison, private hospital, university halls and temporary housing through an overseas volunteer program. Several participants lived in environments where food was cooked by staff members and participants ate three or more meals a day. One participant received food while working for a kebab shop. A number of participants were given food by relatives and friends.

Some participants were also largely dependent on takeaways and processed foods as their main source of meals. Delia described how she obtained food after leaving home at 14 years old:

"I left my Nan's when I was 14. And got into that bad relationship and went back to my Nan's every so often, but eating was just whenever. I don't even remember sitting down and eating from that age. Whatever I could get I eat. From like places like the night shelter or charities, places like that. People would bring food out for me. I mean, I'm not allowed to go in there because I'm underage but people would bring food out for me. Eat a couple of sandwiches and then leave me a couple of sandwiches up the road and say, "You have 'em" and they brought them out but gave them to me. I needed to eat. My food when I was younger was hectic." (Delia, Age 33)

7.3.2 Food preparation skills

After moving out and starting independent living, a larger number of participants were able to cook for themselves or their partner and/or children. The cooking methods among the participants could be divided into several groups: those who reheated ready meals, those who cooked from scratch and those who primarily ate fast food and takeaways. Lance described his first independent experiences with food after moving out of the family home:

"I didn't do any cooking until I moved out. I moved out from the family home about 15 and I started cooking for me self. Mainly processed fast foods from the supermarket. Like, microwave meals. I didn't really learn to cook. I didn't realise what I liked until I got into me early 20s." (Lance, Age 36)

Some participants who cooked for themselves also described their cooking methods using descriptors such as 'steaming' and 'roasting' or specifically stating when they cooked from scratch and when they were using readymade foods. Sarah described the cooking in her household after starting married life at 18 years old:

"I enjoyed cooking. We'd [partner and I] take it in turns. Sometimes we would go out to eat or get a takeaway but mainly it [dinner] was home cooking. I do the shopping every week and then make it from scratch. Sometimes I obviously used to buy pre-prepared meals when I'm tired or something. We always had a hot meal." (Sarah, Age 43)

After moving out of the family home, several participants stated that they could not recall cooking during the period of early independent living. Two participants were consuming alcohol every night and did not cook. Three participants were buying food from takeaways and eating processed ready meals, stating that they were unable to cook at the time. Wendy rented a flat through social housing after 18 months of homelessness, but was unable to cook for financial reasons:

"I could buy a loaf of bread and a jar of peanut butter a week. I would treat myself to one cooked meal so I would buy some potatoes and some vegetables. And maybe doing myself a meal on the Sunday, but the rest of the week I just ate peanut butter sandwiches. There wasn't much money left for much else." (Wendy, Age 41)

Cooking patterns also changed over time as participants matured. A small number of male participants developed relationships and their partners cooked for the family. The male participants reported that they took better care of themselves because their partners cooked and budgeted for the household. One female participant met her partner and started to cook on a more frequent basis, stating that she made an effort to learn how to cook after meeting him. Kurt, who was stealing food and obtaining food from supermarket skips when he first lived independently, met his partner and his eating patterns changed drastically. He described his partner's ability to manage money and cook food on a budget:

"She [partner] was brilliant like, you know what I mean. I give her money and she would get money from Social Security and that, plus she was working. She was a hairdresser and that. She had wages and that. She'd go out with a £10 note and, very honestly, she could come back with... you know. She was clever like that. Very clever...We had all sorts of summer salads and things like that. Lots of curries as well...She was always steaming veg. A lot of take outs, a lot of curries. From the curry shops and things like that. But she was good at cooking them." (Kurt, Age 49)

7.4 Influential factors during heavy drug use

Snack foods, confectionary, and sweets consumption increased drastically during a majority of participants' periods of heavy drug consumption. A combination of factors such as a lack of interest in food and seeking sources of quick energy resulted in a lifestyle largely negating the existence and importance of food. Many participants described their diet as 'not very nutritious', 'junk food' and 'crap food'. Lance consumed chocolate and fizzy drinks:

"When I was on heroin and crack, I wasn't really eating. I'd probably live on a bar of chocolate and a can of Coke the whole day. It would be a bar of chocolate or a can of Coke. Just something to get me through till I got me next fix. I lost a lot of weight. I went down to about 9 stone...for not eating." (Lance, Age 36)

Two participants reported that they binged on food. Oscar described his experiences with food and sleep after using amphetamines:

"It's not like heroin where you just sit there and nod off, when you do speed you're out and doing things all the time. I kept quite fit for a while and never used to eat. I did used to eat a bit of chocolate and that, but probably speed for like a week and then go down to Sainsbury's and buy a load of food. Then I'd have a big eat up and then I'd sleep for like 30 hours. Then I'd start all over again, like." (Oscar, Age 53)

Burt felt like binge eating after using crack cocaine:

"Yeah I felt like binge eating as well...That's because of the drugs though innit. That's the drug taking over, when I want to binge eat. Oh I could eat anything, big meals. I could eat a big meal yeah, but a couple of hours later I'd want to eat another one, then another one, you know. Just binge eat until I feel heavy, know what I mean...I have done after the drugs, I have binge ate where I just keep eating and eating and eating, but that only goes on for like two days after that, three days, after that, not even that." (Burt, Age 46)

7.4.1 Food acquisition

During periods of heavy drug use, many participants reported buying fast food and takeaways or receiving food from charities, shops and shelters. Several participants also begged for money on the street. Stealing food from shops was another method of food acquisition. Participants stole ready meals, chocolate bars, or sandwiches from shops or supermarkets. A smaller number of participants visited supermarkets skips to search for expired food products. Laura described her partner's food acquisition behaviour and her reaction to their lifestyle:

"...The supermarket would put out of date stock and all things that were just about to go out of date on a Sunday, or like a Saturday if the shops were shut the next day. They'd throw out the stuff which had the same out of date code...he [partner] knew what he was doing. He knew...like he'd been doing it for years, you know. And I just couldn't believe...the way I was living, you know. I just, didn't want to be alive anymore." (Laura, Age 24)

7.4.2 Experiences with weight

Weight loss was reported by some participants during heavy drug consumption. A number of participants reported they lost excessive amounts of weight. Irene's emotional state and weight loss continued during periods of heavy drug consumption:

"And then I met my daughter's dad and I was still smoking [weed] and that. Then I started with the crack and heroin with him...Then I had my daughter. That was when Social Services took her off me. My appetite back then, I didn't have one at all. I weren't eating anything. I went from being a size 16 to 18, to a size 6 in clothes. I just wasn't happy. If I'm not happy, I won't eat, I won't drink. I just smoke myself to death." (Irene, Age 28)

A small number of participants reported that they gained weight during periods of heavy drug consumption. Elliott was involved in a hit and run accident during the peak of his alcohol and drug addiction. While in hospital, he gained weight quickly through medical intervention that increased body weight rapidly:

"So basically what they'd done was, they built me up with [medication], I don't know the name of the stuff they gave me, but it's a white liquid. It's a derivative from whales. It's the fat and it throws weight on you and I came out with a good weight on me, basically...When one of my friends seen me, he couldn't believe it was me. He couldn't recognize me - I was that thin because of the trauma. Then when I come back out I couldn't recognize myself basically, when I come out." (Elliott, Age 46)

Brandon experienced weight gain due to excessive eating and inactivity after his mother passed away. He was smoking cannabis and heroin during the same period and became physically inactive:

"Just eating. Eating too much. Not exercising. Just eating and not doing nothing. Just sitting about. I was quite active any other time, but a few times in my life I just lay down and start putting on weight." (Brandon, Age 40)

Some participants reported large fluctuations in weight. Participants largely spoke about weight loss while doing drugs, but three participants spoke exclusively about their fluctuations in weight that occurred at one or more points in their lives. One participant lost weight due to his drug use, but gained most of the weight back after he decreased his drug use. Another participant experienced extreme weight loss and weight gain according to her emotional well-being at the time. Kyle experienced mental health medication side effects:

"When I first started taking the medication I was given for schizophrenia I blew up to 19 stone...Yeah, my weight, it kind of fluctuated throughout my life. I was big as a child. My later teens I lost it and I was in hospitals and prison and I gained it through medication. Just eating and doing no exercise. Yeah, being in private hospitals where they absolutely feed you constantly all day." (Kyle, Age 34)

7.4.3 Digestive health

Participants reported having appetite suppression and reduced feelings of hunger while using crack, heroin, or amphetamines. Participants consumed food out of necessity rather than pleasure or enjoyment. With reduced feelings of hunger, participants tended to eat only when they felt weak. Weakness and lack of energy became a physical sign that it was time to consume food for energy. Participants met their caloric needs by consuming quick sources of energy, snack foods such as fizzy drinks, chocolate and sweets. Elise described her experience during heavy drug consumption:

"It depends basically, what state you're in because heroin's a downer, and crack's an upper. Depending on how much you use, if you're really having a good time...you just can't be bothered to cook and it don't really bother you if you haven't eaten a proper dinner or whatever. But for some people it's like if you smoke less, it bothers you then, because you do get really hungry. So instead of like pecking out on like junk food, you'll actually go and cook. But for me, when I was using every day, I never cooked. I was basically just living off of junk food." (Elise, Age 34)

Several participants experienced increased hunger and appetite stimulation. Two participants specifically stated that heroin alone caused increased feelings of hunger. One participant felt hunger pains and stomach cramps when the effects of the drug began to cease and used drugs again in order to stop the discomfort. Dana at times had intense feelings of hunger and experienced a watery mouth:

"Sometimes I would get a watery mouth. Do you know what I mean by that? A watery mouth, from wanting to eat something. The hunger was so bad I used to get a watery mouth from wanting to eat something, but I had no money to do it. I didn't want to, and the last thing I wanted to do was steal anything from anywhere. So um, I used to end up stealing sometimes sandwiches from shops, actually just down here. So yeah, it was pretty, pretty bad." (Dana, Age 29)

Participants reported stomach cramps, pain and heartburn and often cited drugs and alcohol as the cause of their ailments. Many participants experienced discomfort, particularly in the stomach. A smaller number of participants stated that they experienced stomach pains/cramping particularly after the consumption of food, stating that the stomach pain was a potential side effect of drug use. Kyle recounted his experiences with stomach pain:

"I get prescriptions of omeprazole. My stomach, I just get bad cramps which I think is a side effect of all the drug use. Sometimes my stomach can't...I'll eat a meal but my stomach just hurts. I don't even have to eat a lot." (Kyle, Age 34)

Nausea and vomiting were mentioned as side effects of drugs, particularly crack cocaine or heroin. Laura described the nausea she experienced and how it affected her food consumption:

"When you're drinking sort of day in and day out, it takes all your taste buds away. And when you're smoking and taking drugs, sometimes you feel sick when you're taking drugs, so you not wanna eat. Especially with crack and things like that...you don't feel like eating cos your mouth just tastes like fag ash and dirt...It'd be easier if someone put a drip in your arm and your food went that way. Cos it doesn't want to go in there. You're lucky if it stays in." (Laura, Age 24)

Diarrhoea and watery stools were experienced by many participants, as a withdrawal symptom of heroin and a side effect of crack cocaine. Two participants described diarrhoea as not simply watery stools, but a loss of rectal sphincter control and bowel incontinence. Oscar described his heroin withdrawal experience further:

"Yeah, it's worse than diarrhoea. You lose like all of the muscle control in your bottom and that. I'm not trying to be offensive but...it just drops out basically. That's how horrible it is. All of the badness comes out of your backside and all that." (Oscar, Age 53)

Harry reflected on his experiences with bowel movements during heavy drug and alcohol consumption:

"I never had any stools; it was just water, diarrhoea. You'd just go to the toilet and you couldn't move. Count how many times you'd go to the toilet. If I had something to eat like a sandwich, in 20 minutes it'd go through you." (Harry, Age 47)

Constipation was a common symptom among participants. Many participants spoke extensively of their problems with bowel movements, both cramps and pain. Constipation seemed to worsen at higher doses of opioids. Several participants had a bowel movement every three to five days while using heroin. A number of participants had severe constipation issues and had no bowel movements at all for two to three weeks. Kyle, who also suffered from stomach issues, mentioned his experiences with constipation:

"Sometimes it hurts when I go to the toilet, you know. Sometimes to the point where I might have bowel cancer or something." (Kyle, Age 34)

Elise described her experiences with constipation and having a bowel movement:

"It was like the Titanic. But it...was like a rock. It's like it wouldn't come out by itself so I had to put a glove on basically and help it out. That's how bad it was." (Elise, Age 34)

Edward reflected on the side effect of opiates on the gastrointestinal system:

"If you were banging the gear [heroin] and you don't go regularly. And then when you do go, it's like you're giving birth...Opiates stop you going. You get totally constipated and it builds up, and builds up, and you're in trouble." (Edward, Age 46)

7.5 Overview

Participants' food consumption behaviours were shaped by positive and negative experiences from childhood and as they matured into adults. Many participants reported positive food experiences related to cooking by family members and the social experiences connected with food consumption. On the other hand, the participants who suffered from neglect, trauma and abuse reported lasting effects that caused greater erratic food consumption behaviour than other participants.

Participants reported the challenges of food acquisition and cooking after moving out of the family home. Financial constraints, lack of food knowledge, preparation or lack of interest in food were some of the reasons cited. However, some participants with more settled living environments reported stable food consumption patterns either due to having a partner who provided a reason to cook or could cook for the participant.

Food consumption became secondary to drug use during periods of heavy drug consumption. Extensive long-term drug use not only affected food consumption behaviour, but also altered food acquisition behaviour. Participants were committing crimes to acquire food or rummaging through skips to find expired stock. Snacks and higher energy, calorie dense foods were chosen over fresh or cooked foods. Participants also ignored food when their appetites were suppressed and eating only when they became physically weak.

Digestive health was also affected during heavy drug consumption. Many participants complained of lasting side effects related to stomach ailments and bowel movements. Eating a meal had its difficulties, causing stomach cramps or heartburn. Experiences with diarrhoea and constipation were severe.

Chapter 8 Dietary behaviours during OST

8.1 Introduction

This chapter explores participants' food consumption patterns while receiving opioid substitution treatment (OST). The themes that arose from participant's experiences were: food consumption, eating and drinking events, food acquisition, budgeting and finances, food pricing and food quality, food preparation, physical and mental health, body weight, dental issues, digestive health issues, nutritional knowledge and dietary guidance. These themes emerged when combining both the baseline data and the follow-up data.

8.2 Food consumption

Many participants expressed unhappiness regarding their food consumption. Most of the female participants felt unhappy about their eating habits, weight or diet. A small number of participants thought they were not eating a good or balanced diet. Dana was aware of the quality of her meals and how it was affecting her diet:

"Because chips and cheese isn't a good diet. I need vegetables, I need fruit. Thank God I don't like sweet things. I hate sweet stuff. I never eat sweet stuff. So, potato and cheese isn't, and mayonnaise with some salt on chips, isn't a good...isn't a good diet...No, I'm not happy with my eating." (Dana, Age 29, Stage 1)

A small number of participants expressed happiness and satisfaction with their eating habits. As participants' living environments or circumstances changed, their ability to prioritise food and eating became altered. Laura, who had her children returned to her care, reflected on the feeling of eating with her children around the dinner table:

"It's nice to sit down in the evening at a table, as a family....No radio, no TV, candles on sometimes, bit of classical music. Just relax and come back. Come back to our unit of three...We do try to plan what we eat and we eat quite healthy. Normally we eat quite healthy. In the winter and that we do lots of stews and casseroles. There's a hot, cooked meal every day." (Laura, Age 24, Stage 1)

Lance actively made changes to his diet after he started OST:

“Yeah, like breakfast. I'd never used to eat breakfast. Like when I was a kid, I used to have breakfast before I went to school, but all through me 20s I'd never eat breakfast. It's only because I started going to the gym recently that I eat breakfast. Sometimes I force breakfast into me in the morning. So it'll open up me stomach so I'll be hungry for lunch. Does that make sense?”
(Lance, Age 36, Stage 1)

Food consumption among the participants was assessed by analysing eating and drinking events over the course of five days. Data from the 24HR were used to determine eating events and eating schedules. Foods such as crisps, confectionary, sweets and chocolate were considered as snack foods. Meals included any hot or cold foods such as sandwiches, homemade meals, takeaway foods and instant foods. Both non-alcoholic and alcoholic drinks were assessed in the analysis.

8.2.1 Eating and drinking events

In the current study, the data from eating patterns of the group suggested frequent eating occasions. The mean (SD) number of meals consumed over five days were 10.9 (3.4) meals and mean (SD) number of snacks were 8.3 (7.7) snacks. Participants consumed approximately two meals and two snacks per day. The mean (SD) number of alcoholic and/or non-alcoholic drinks consumed was 30.1 (10.9). Participants consumed approximately six drinks a day. Two participants (8%) experienced one day with no eating occasions at all. In contrast, three participants (12%) had one day or more of ≥ 2 meals and ≥ 3 snacks or ≥ 1 meal and ≥ 6 snacks. Two participants (8%) consumed one to two meals over the course of the day and also consumed ≥ 4 snacks in the evenings from 6pm – 12am over three of the five days.

At follow-up, participants consumed a mean (SD) of 11.9 (4.0) meals and 9.5 (10.3) snacks over five days. The mean (SD) drinks consumed over five days was 28.1 (8.4) drinks. Participants consumed approximately two meals a day, two snacks a day and six drinks a day. One participant (5%) experienced a day without any eating occasions. Eight participants (40%) had one day or more of ≥ 3 meals and ≥ 3 snacks. Three participants (15%) had ≤ 1 meal and ≥ 6 snacks. Seven participants (35%) consumed one to three meals over the course of the day and additionally

consumed ≥ 3 snacks in the evenings from 6pm – 12am on at least one of the five days. Participants consumed meals and snacks more frequently at the follow-up stage.

Stress and traumatic issues caused limitations to consume specific types of foods. A small number of participants lost their appetites, replacing meals with snack foods or quick and easy foods that could be eaten while on the go. Elise searched for foods that met her needs through trial and error:

“I was basically eating bread with no crusts on. I could actually eat Weetabix. Cos I know Weetabix softens down straight away. Porridge, I found a bit too lumpy. So I wasn't having that. So mainly I was living off like yogurts, bread and Weetabix.” (Elise, Age 34, Stage 1)

Delia found the stress from her court proceedings caused her diet to become more erratic by replacing meals with snack foods:

“Just eating healthy bars and stuff like that. I wasn't eating proper meals, like three set meals a day. I wasn't eating like that; I was eating something every so often, like a healthy bar or a whole pack of six healthy bars, you know, rather than actually making the effort to have...a proper meal like vegetables and meat and everything that I need: protein and everything.” (Delia, Age 33, Stage 1)

Several participants mentioned bedtime snacking or drinking. Some participants woke up in the middle of the night and snacked on food. A number of participants mentioned replacing meals with evening or late night snacks. Carmen seemed to eat regularly during the day, but snacked late in the night:

“I just eat when I feel like it. I try and have like, breakfast every day. I try and have lunch and not eat in between those two and not eat again till tea, but I tend to be an evening snacker or I eat really, really late. Every night I take something to bed with me, and I do wake up in the middle of the night with really bad hunger pains. Like I haven't eaten for days. So yeah, I have to make sure I take something to bed with me.” (Carmen, Age 22, Stage 1)

Many participants reported eating more snack foods and fizzy drinks during the second stage of the study. Participants preferred savoury foods such as crisps and sweet foods such as ice cream, chocolate and biscuits. When referring to their snacking habits, participants referred to their snacking as ‘cravings’. Snack consumption, in large amounts or during the night, occurred more frequently. Elliott drank bottles of fizzy drinks every day and snacked on chocolate at night as he recounted:

"Some nights I won't [eat chocolate], some nights I will... But this morning [my partner] bought me a bag of chocolate and I'll probably eat that when I wake up tonight... I'll go to bed tonight and when I wake up, I'll probably wake up and eat it. Maybe not, I might leave it for another night. I would say about five out of seven nights I'd eat chocolate, maybe four out of seven. I don't know. Not every night I do it." (Elliott, Age 46, Stage 2)

Norma connected her snack consumption to her emotional status and how her food consumption affected her weight:

"Um, I put on weight since I last saw you. That's because of my depression. When my depression kicks in I end up eating loads of junk food and snacking and everything. So it's [my diet] been quite shit really. I don't know what else to say about my weight." (Norma, Age 30, Stage 2)

8.3 Food acquisition

Several participants recounted their food acquisition experiences by mentioning examples such as limited food storage facilities. These particular circumstances restricted participants' food choice by limiting their ability to acquire and store food. As a result, participants spent more of their finances by purchasing processed foods and takeaway meals. Due to the inability to store food and inaccessibility to cook food, Norma bought vegetables and fruit that were already processed and packaged:

"I try to eat it [fruit and vegetables] at least once or twice a week. I go to Sainsbury's to buy a salad bowl and then a fruit bowl. Like with different fruits in it. Guaranteed, once a week I buy that. A salad bowl and a fruit bowl, guaranteed that I get something. Only a little bit, not much, but it's something." (Norma, Age 29, Stage 1)

Disability from accidents or illness and limited mobility such as lack of transport or finances for public transportation restricted food choice. Some participants expressed difficulty in finding diverse foods to incorporate into their diets and lacking the freedom to make food choices. Edward was disabled and had limited mobility as he spoke about his inability to travel far for food shopping:

"Well, [this town's] only got a chip shop and [a corner] shop, so there's not much variety unless you go to [the next town]... Sometimes I've got an appetite and I want something nice to eat, but it's travelling to get something to eat. It's all timing and everything." (Edward, Age 46, Stage 1)

Brandon did not own a car and was unable to drive. He had difficulty accessing larger supermarkets in the surrounding area and was dependent on friends for some of his grocery shopping:

“When my mate goes, my friend...he goes to Tesco's every two weeks...When he goes, he takes his mum and he takes me as well. I just get a bit there. Because it's so far, if I ain't got a car I can't even get there. I could ask my dad for a lift, but he's disabled. He don't really like going and getting out of the car that much.” (Brandon, Age 40, Stage 1)

A small number of participants also found difficulties shopping for food due to mental health issues. Though loss of appetite and refusal to eat were side effects of severe depression, food shopping also posed a problem. Theodore, while experiencing a severe depressive episode explained the financial differences and ability to shop when feeling unwell:

“It's not that bad. It hasn't been shockingly bad. The problem is, when I was so totally depressed, I was getting to the point where I was really hungry. I was buying stuff from the local shop, which is so extortionate...The Tesco's is about a mile away, the big Tesco's. It's not that much. It's only about twice as far from the corner shop. The corner shop is quite a way away as well. That why I say I'm quite isolated, where I live. The corner shop is almost a mile away... If you're organized and together and motivated, then it's not a problem, paying for the food. It can be quite pleasurable, getting decent, cheap food. If you're not well, then it becomes difficult. It becomes more expensive, as well.” (Theodore, Age 37, Stage 2)

8.3.1 Food budgeting and finances

Several participants also experienced difficulties as a consequence of being unable to budget their finances. Some of the reasons participants gave were: buying alcohol, drugs or both from the food budget, not knowing how to budget or trying but failing to budget. The participants who experienced difficulties with budgeting also referred to emotions such as ‘annoyance’, ‘frustration’ and ‘anger’ when they struggled to support themselves. Two participants resorted to visiting supermarket skips to search for expired food products when they lacked funds. One participant reported shoplifting when there was no money for food. Carmen was unable to budget effectively and scraped for funds just before payday as she explained about struggling twice a month:

“It annoys me, but then, normally it's because I wasted my money on something earlier on in the month, or I've not calculated my bills properly, and I had an unexpected bill come up. Which is annoying, but it's one of those things in life.” (Carmen, Age 22, Stage 1)

Many participants experienced financial difficulties with their benefits or a sudden change in their financial status that affected their ability to budget for food. Changes to benefits, re-assessment of benefits and award of new benefits occurred to a small number of participants. One participant's partner was made redundant and their financial status was suddenly changed. One participant was released from prison and was in the process of setting up his benefits. Wendy and her family received food from the food bank for three months during a financially difficult period:

"I mean, tax credits all went wrong this year and we ended up, gosh, we went almost 3 months with no income. And I had to use the food bank then because I don't have family...But there's been enough left in the freezer and stuff for the kids. I would just eat less if there's less food."
(Wendy, Age 41, Stage 1)

Most of the participants had a budgeting method. Different budgeting styles existed for each individual. Many participants set aside a fixed amount of funds dedicated to food shopping. Some participants also dedicated their funds according to priority. Bills, payments plans and/or loans were paid first and leftover funds were applied to food shopping. A small number of participants tried to make food shopping a priority in their lives; therefore shopping for food took place on payday. Laura spoke in detail about her budgeting and shopping methods to provide for herself and her two children:

"Um, I mean I work out what I need, and then I work out roughly how much it is and put a sort of price range next to each category, like dairy. For like the dairy stuff, I'll say like I need £10 there. For fruit and veg, for everything together, for two weeks I'd say um, about £20 there. And for meat, I'd put another £20 cos it's expensive. Then there's tins and cupboard stuff. Sort of work it out there. I try to add it up as I go along. And what I do is I put everything that I need in the trolley... any additional things like luxury things like chocolate or biscuits or something that I don't need, I'll put at the end of the trolley. So when I do the checkout, I'll put everything that we need on first and then additional things I put at the end. And I put a separator next to it. So when I've paid, I'll see how much it comes to and if I've got enough and that's in my budget, then I'll add whatever I can or if all of it to the shopping. Additional things, you know. Things you don't need. But it would be nice to have." (Laura, Age 24, Stage 1)

A small number of participants spent time shopping at various supermarkets to get the best prices on food or household products while a number of participants also shopped strictly for offers, deals and reduced price items.

8.3.2 Food pricing and food quality

Opinions among the participants were divided on the topic of food pricing and satisfaction. There were a number of participants who were isolated in areas where the supermarkets nearby were unaffordable or were one mile or more away. These participants held more negative views of food pricing and their accessibility to buy food.

Lance, who had a variety of resources open to him due to living near major supermarkets, local shops and speciality shops, explained the quality, affordability and the differences among shops:

"The variety is there, but it is expensive. Food shopping, it's a fair chunk out of, if you're only living on benefits. But um, I wouldn't go shopping in Iceland for £1 meals and stuff like that. I don't eat that sort of stuff. I'd rather spend the extra and buy at Tesco's or Sainsbury's or something, yeah." (Lance, Age 36, Stage 1)

Major supermarkets were compared for their value. Most participants preferred Tesco and Iceland for their food shopping needs. Supermarkets with their own brand range held more favourable views among some participants. Some participants separated supermarkets and local shops by the available variety and range of foods for their needs.

"We normally go to Tesco's once a day, at least once a day. We go to the [local area] Tesco's once a week, we'll go to [another local area] Iceland once a week and over across the road, ASDA. We need to go there today, later on in the day or tomorrow. Yeah, we tend to do quite a bit of shopping." (Elliott, Age 46, Stage 1)

Most of the participants mentioned their ability to access food for free or at a subsidised rate. When participants had no funds to buy food, they were able to access services to receive free and/or subsidised food. Some of the examples mentioned were: hostel canteens, charity organisations, food provided by family and/or friends. Oscar received food from various sources:

"There are a lot of people in town who buy me food I know from the Big Issue and that. People buy me like sandwiches...I go to this community centre in [a church] and that, once every month. They have a meal down at the church tower there. I used to go to [a charity organisation] in the evening and they give you a sandwich and a bit of cake and a bit of pizza and that. I haven't been there for a while, but again for socialising and seeing people down there and that. Some people buy the Big Issue off me in town. They'll buy a sandwich or bake cakes and they give me a slice of cake. I've got quite a varied diet really." (Oscar, Age 53, Stage 1)

Burt mentioned how he acquired food when he had no monetary funds to buy food:

"I go without. Or I go down to the [charity organisation]. If I ain't got money and I'm hungry I'll fly into the [charity organisation]. That's open 6 days a week." (Burt, Age 46, Stage 1)

8.4 Food preparation

Several participants expressed a lack of interest and/or a fear of cooking. Negative experiences, frustration, fear and lack of confidence seemed to cause anxiety when participants described at length about their experiences with cooking. Irene recounted her experiences cooking and the problems she encountered:

"...It sounds weird, but every time I go and buy ingredients I give us food poisoning. But if I'm cooking from scratch, I don't. It's a bit weird. Cos I thought it would be the other way round, but it's not. Every time I've used ingredients, I've given us food poisoning. He's [partner] done the same as well. He cooked some burgers but he didn't let them defrost first. Well, he didn't cook 'em properly either. Cos they were still frozen in the middle. The outsides were done and the middle looked done, but it wasn't." (Irene, Age 28, Stage 1)

Delia expressed a fear of being near hot fat while cooking. She also expressed awareness when she felt it was necessary to ask for support. She asked her partner to watch food cooking in hot fat due to her discomfort:

"I was [cooking], but I still had my ex-partner keep an eye on the cooking cos I don't like staying near fat and stuff like that...It scares me being near hot fat cos I don't want an accident to happen. I wouldn't do that. I tend to try and stay away from them as much as possible, but I mean I don't have a problem with putting something in and taking it out. But if it's something like chicken and it's spitting on the way out, I'll get somebody else to do it because I feel more secure getting somebody else to do than me." (Delia, Age 33, Stage 1)

Most of the participants expressed an interest in cooking. While several participants enjoyed cooking for others, they were not interested in cooking for themselves. Participants referred to cooking as a level of satisfaction or achievement as they described the experience. Carmen described cooking and the sense of achievement she felt with the final product:

"I like the accomplishment at the end of it. You start out with different ingredients and you end up with a finished thing. If it tastes good, then you know you've done a good job so that's really good. I find it quite relaxing to be honest. When you cook, there's not a lot of regimenting, there's not really a lot of variables in cooking. So yeah, I don't know. I do find cooking quite relaxing. I enjoy it." (Carmen, Age 22, Stage 1)

Sherman recounted his thoughts on cooking:

"I used to really enjoy it...With cooking it's one of these things like you get the end product, you know what I mean. You just got like a table full of ingredients. Yeah, you get quite a lot of satisfaction out of it, you know what I mean. That's how I get juiced [motivated]." (Sherman, Age 44, Stage 1)

8.5 Physical and mental health

A majority of the participants described their everyday lives as having nothing to do. Erratic sleeping patterns caused participants to sleep at varying hours of the day, while some participants slept after taking medication, which could equate to two to three naps in a day. Most of the participants only went outside to receive their OST prescription from the pharmacy, walk the dog, or walk their kids to school. Most participants 'couldn't be bothered to cook', felt 'lazy' to acquire food despite having the time to perform these activities. Carmen described how she chose to bake frozen food over fresh food:

"Just cos I'm lazy. Like, literally I've been here [at work] all day and it's much easier to put something [frozen food] in the oven and forget about it. Rather than just sit and boil the veg and prep the veg. But sometimes it's just timing cos sometimes I'll work here till half five, six o'clock and then be working in the evening as well. So I'll be back here for seven or out for seven and there's just not the time." (Carmen, Age 22, Stage 2)

Sherman stopped his weekly food shopping:

"Well, I mean, that's another thing I've gotten lazy with. I used to go, like a weekly shop [for food] when I got paid, but I haven't been doing that either. I've just been doing that day to day. Know what I mean. It isn't good, really. And some days if I haven't got anything I just have to make do [with food], you know what I mean. What I can get really." (Sherman, Age 44, Stage 1)

At the follow-up stage, half of the participants reported feeling low, depressed, worried and anxious during the four month interval between the first and second stages of the study. Several participants stated their emotional problems affected their motivation and lost their appetites on more than one occasion. One participant was hospitalised for trying to commit suicide twice.

Theodore replaced his meals with tea as he described:

"When I was depressed, I didn't do that [plan and buy food]. Maybe I didn't have food in. I didn't have any drive to go out and seek food. I was mainly just surviving on cups of tea. I was taking sugar again, in my tea. I realized that was a source of depression that I needed to get some energy from somewhere. I started taking sugar again, in hot drinks." (Theodore, Age 37, Stage 2)

8.5.1 Body weight

Some female participants worried about their weight and felt they were excessively overweight. They reconfirmed their anxiety from overeating and excessive energy intake when participants gained weight as a result. Irene reflected on her eating by comparing the results of her consumption to her body size:

"Because I'm eating too much. I can't stop eating. I want to cos I'm putting too much weight on. I don't fit into any of my clothes...And sometimes I can't find clothes that would fit either. I may not look big, but I bloody am." (Irene, Age 28, Stage 1)

While many participants expressed unhappiness about their weight, particularly with regard to weight gain, a small number of male participants gained weight after four months. Three participants described their weight gain while on OST as 'comfortable.' During OST, Brandon regained his appetite and aspired to gain the weight he lost previously:

"It's just drug use and that made me lose a lot of weight. I just lost my appetite. Now I got an appetite again. I used to be 13 and a half stone and now I'm just above 12 stone, I think right. So I want to go be back to at least 13 and a half stone. That's my proper weight. So I felt good anyway. I think it's 13 and a half, or what I should be. But I want to be 14 stone." (Brandon, Age 40, Stage 2)

Sherman, who was underweight at the first stage of the study, described his weight gain:

"Yeah. I think it [my weight] is going up slightly. That's what my jeans are telling me, anyway. Yeah, I am. Which is why I'm trying to make more of a conscious effort to eat a little bit more. I'm more concerned about my health in general." (Sherman, Age 45, Stage 2)

Issues with weight became an increasingly difficult topic for some of the female participants at the second state of the study. Participants experienced eating issues, body dissatisfaction issues,

and going to great lengths to lose weight. Irene felt depressed about her weight during the first stage of the study and lost her appetite at the second stage of the study:

"My appetite's disappeared since I last spoke to you. It has disappeared. I just don't feel like eating at all. Even when I'm hungry I just....don't know, I just don't want to eat. Think it's because I'm so set on losing a bit of weight I'm doing it that way instead of doing it the way I was told to do it [physical activity]." (Irene, Age 28, Stage 2)

8.5.2 Dental issues

Several participants experienced problems with their dentition. A small number of participants no longer had teeth. One participant had multiple teeth removed during the first stage of the study. Another participant had dentures but never used them. Of the participants with dental issues, all of them expressed the need to avoid hard, crunchy foods. Foods needed to be soft, tender and easy to chew.

"Yes. I had two teeth taken out on either side at the bottom. And they're the teeth you need for chewing. If it's food that's really hard or something, it's awkward. I'm in the process of having a plate put in, so it's difficult. Unless it's something you can chew quite easily, it's annoying." (Sarah, Age 43, Stage 1)

At the follow-up stage of the study, Burt experienced severe dental issues and pulled multiple loose teeth from his mouth:

"Yeah, it [loose teeth] was annoying me, innit. They were annoying me with being loose and when I'd eat...Then you're eating and you've got loose teeth they hurt your gums when you chew your food. So I pulled them out, innit. I sat there one night with the mirror and pulled them out." (Burt, Age 46, Stage 2)

8.5.3 Digestive health

Several participants experienced stomach pain and nausea. A number of participants, who drank large amounts of alcohol in the past, complained of stomach acid build-up and bile vomit during the course of the study.

Sherman experienced nausea and bile vomiting every day as he described:

"I've got a bit of a stomach problem at the moment. Yeah, when I get up in the morning, I'm normally nine times out of ten, sick. It's just sort of bile or phlegm comes up really. But I don't know. It's as soon as I get up and start moving around, I'll be sick and that'll be it." (Sherman, Age 44, Stage 1)

A number of participants also felt nauseated after drinking their OST prescription medication. Some participants changed the time of day they took their doses. Other participants changed the pharmacies, after finding the pharmacy's stock disagreeable. Carmen experienced nausea after taking her OST medication:

"Yeah, I tend to feel ill afterwards, even if I've eaten, it makes me feel quite sick. But if I haven't eaten, I definitely am sick. Without fail. I found that different pharmacies have different brands. At Boots they have a different brand, it's not actually methadone, it begins with P. And that makes me sick as a dog, really sick. It's something in it that obviously doesn't agree with me." (Carmen, Age 22, Stage 1)

Some of the participants previously felt nausea after taking their OST prescription dose. They prevented nausea by eating food prior to having their daily dose. Ted experienced stomach pain after taking his OST medication and tried to alleviate the problem:

"Yeah, I just had a problem with my stomach. When I was taking before without eating, I would take my methadone and it was very painful. I would have problems with my stomach. But then I eat something and I take my methadone, it's better. Now, I'm just doing the same thing. I eat something, like one biscuit or two biscuits in the morning, then I take my methadone and I feel better. Before, it was very painful. I was getting pain in my stomach and everything like that." (Ted, Age 38, Stage 1)

A small number of participants experienced regular bowel movements. Participants had bowel movements once or twice a day, at the same time each day. Two participants had bowel movements every other day, with the help of prescribed fibre granules or laxatives. Most of the participants stated that they experienced symptoms of diarrhoea or constipation while receiving their OST prescriptions. Many participants had difficulty having a bowel movement without a prescription laxative or fibre. Two participants also suspected they had Irritable Bowel Syndrome.

Carmen had problems with severe constipation:

"No, my bowels are like, I don't know what's wrong with them. They don't seem to work at all really. As it stands at the moment I don't have any bowel movements and that's why I'm on laxatives. They're [GPs] saying it's because of the methadone. It relaxes all of your muscles and stuff. So it doesn't work properly because of that. I think it's more of a long-term effect. Cos I can always remember suffering really bad with constipation and stuff. And I went to Africa for 10 days and I know for ten days I didn't go for a poo. I didn't feel any ill effects of it either. There must be something. Most people would feel really uncomfortable after that long. But I didn't." (Carmen, Age 22, Stage 1)

Oscar experienced problems with frequent diarrhoea at the time of the study. He was beginning to feel embarrassed and depressed with his bowel problem as he described:

"This last year, the last 18 months, my bowels seem like they're coming apart. Like in the old days, at this time of the day I would think, "I need to use the toilet." I would find the toilet and use the toilet. Now, I get the effect now where I get a minute's warning. If I want to get to the toilet, it's coming out of my backside. It might sound a bit crude and that, but it's the truth." (Oscar, Age 53, Stage 1)

Some participants who received prescription laxatives refused to use them because they had no effect on their gut functioning. Irene described her experience with laxatives:

"The doctors, they give me Natulose and stuff like Fybogel and that, but none of the stuff works. I keep telling them it don't work. And they still keep giving me more." (Irene, Age 28, Stage 1)

At the follow-up stage of the study, one participant's bowel issues became more severe. Oscar's bowel problems began to affect his self-esteem:

"I have to purge myself, basically. That's why I don't eat a great deal during the day. Cos, basically there's only one [public] toilet in town that's open. I'm sitting all the way down here [ten-minute walk]. I usually get about five minutes warning that I want to use the toilet. Basically, it's [my sitting place] closer to the ladies toilet, but sometimes I can't even make it as far as the ladies toilet. There's only 50 yards down the track, right. I mess myself, basically and it's really embarrassing because you've got to walk around all day messed up. You clean yourself up as best as you can in the toilet. It's better now that I've got a shower and keep my personal hygiene, a bit better than what it was. It's embarrassing and it's really got me down as well." (Oscar, Age 53, Stage 2)

8.6 Nutritional knowledge

'Five a day' is a campaign led by the UK to eat five 80 g portions of fruit and vegetables a day.

WHO recommend eating a minimum of 400 g of fruit and vegetables a day to lower the risk of

NCDs. A majority of the participants were aware of the concept of 'five a day' and the message behind it. Many participants linked 'five a day' and fruit and vegetables to a healthy diet. However, several participants believed the concept meant to consume five fruits or five vegetables a day. Some participants, despite having heard the campaign, had no idea what the phrase meant, while others had never heard of it at all.

Nutritional knowledge ranged among participants. Most of the participants showed awareness of healthy foods or healthy eating in various ways. A frequently used description of a healthy diet was to 'eat a bit of everything' or 'eat in moderation'. A number of participants also suggested reducing consumption of 'fatty foods,' 'junk foods' and 'processed foods'. Oscar gave an explanation of what he thought a healthy diet meant to him:

"It means to keep me body pretty healthy. Same as doing exercise I suppose. It's basically, your body is like a machine, it's like an engine. If you fire loads of bad sweetie things into it, sweets and things, it's going to break down, isn't it? You need a healthy, balanced diet to keep your digestive system good and your heart good and your lungs good, etc, etc, etc, I suppose..." (Oscar, Age 53, Stage 1)

Theodore was aware of the dietary campaigns to reduce fat and salt intake and the campaign for 'five a day'. He elaborated on his nutritional knowledge by describing a healthy diet:

"Well, it means not too much fat, not too much salt...fiber. Everything in moderation really. Make sure you're getting your vitamins. It was something like, you'd have a cereal for breakfast. Maybe a bit of milk. Some dairy products. Maybe a bit of meat, but very little meat basically. If you're gonna eat it, lean meat. Fish is also an alternative source of protein. Probably a better one. That's kind of a balanced diet. Not too many sweet and cakes." (Theodore, Age 37, Stage 1)

Some participants stated they were unsure of the exact meaning of terms such as 'protein' or 'carbohydrates'. Wendy stated she was unsure about any nutrition terms:

"To eat a little bit of everything. So not just fatty foods or, to be honest with you I don't know what a carbohydrate or a protein...which one is proteins or which one is carbohydrates. So I don't really know much about it. But it means to eat a little of everything that's good for you and not just crap, I guess, to me." (Wendy, Age 41, Stage 1)

The idea of fruit and vegetables consumption did not seem to pose an issue for a majority of the participants. Many of the participants expressed their desire to eat fruit, vegetables or both. Though they were open to eating fruits and vegetables, this desire was not exercised in their daily

lives. Participants felt barriers to eating fruit and vegetables for a number of reasons. The most frequently described reasons were the unaffordability of fruit and vegetables and the amount of time and effort to prepare them. Karen talked about her thoughts on vegetables:

"I love vegetables, actually. Not so keen on fruit, but I love vegetables with my meal. But it takes a bit more discipline to eat fresh vegetables and put more vegetables on your plate, I think."
(Karen, Age 51, Stage 1)

Participants were asked if they were aware of their caloric intake. A majority of the participants were unsure or unaware. Several participants estimated a range of 1500-3000 calories/day, while some participants stated they were 'way over the limit.' One participant associated calorie counting with dieting or eating disorders.

8.7 Dietary guidance

Participants were asked if there was a service to ask about dietary advice or nutritional guidance. There was a divide among participants as to whom they would ask for guidance. Many participants referred to their doctor as their first point of contact. A number of participants also suggested their drug worker, key worker or community services as their point of contact. A small number of participants who were diabetic were referred to their diabetic nurse or a nutritionist for further dietary guidance. Participants who had children had opportunities to speak with a nutritionist regularly and could ask for information about family eating. One participant also mentioned that prison facilities offered a course on healthy eating and diet.

However, a small number of participants had sought dietary advice and received a negative outcome. These participants stated that they were not given sufficient information, appropriate information or were patronised and judged before information was given to them. Harry was given diabetes-related nutritional information previously, but was unable to read it due to dyslexia:

"No, I think my eating could be a lot more healthier. Because of my dietary needs...I think I should have more ways of controlling my diabetes. I wish someone could show me how to eat more better. That's what I'm asking. There's no point giving me a leaflet because I wouldn't make head or tail of it, you know what I mean. But if you showed me, if I had diagrams or something, you'd say "It's this way" then I'd know." (Harry, Age 47, Stage 1)

When Theodore experienced his depressive episode, he sought dietary advice from this drugs worker. He found his experience offensive and patronising as he explained:

"Well, yeah. I had that blazing row with that drugs worker that other day, at [drug and alcohol services]. I said, "I'm not eating very well." That was when I was really depressed...He said, "What, you're eating fast food?" That's when I said, "A) You're making a stereotype. I told you I'm not eating, because I'm not motivated." Then, he asked me, "Do you cook for yourself, and do you budget for food?" I explained that I do that. It was in a very patronizing way. There is a stereotype that a lot of people who use drugs - they may not plan their diet, and they may just eat fast food on a whim. I'm not one of those people. I find that very offensive." (Theodore, Age 37, Stage 2)

Participants were asked about their thoughts on receiving nutritional and dietary guidance as a part of a support service. A majority of participants thought guidance was appropriate if it suited their needs. The type of advice varied from food preparation to lifestyle advice. Most participants requested advice on the appropriate quantities and types of foods in order to achieve a healthy diet. A small number of participants particularly asked for advice regarding meal planning, cooking courses, cheap and easy recipes and advice about lifestyle changes and changes to eating habits. Two participants suggested disseminating dietary advice to people who were in residential treatment.

Theodore explained his rationale for suggesting residential treatment as an option:

"But I do think it would be useful for other people. But then again, if they're in the cycle of addiction, you know, their priorities are gonna be all messed up. Even though they might retain the information, it will never be used. This is gonna sound very bleak, but time to give them information is when they're in a rehab setting. I think it would be, you know, the [residential treatment centre] maybe we could have had some education there." (Theodore, Age 37, Stage 1)

Karen suggested the drugs worker as the point of contact:

"Yeah. I think it is important to educate people who had that kind of lifestyle. Because I think we lose touch with what's important. You know. And um, nutrition comes quite low on the list of what's important. And of course, it is very important, you know. So I think it's very important, yeah. Maybe they should introduce it...to the people who are supposed to be helping people who have addiction problems. Rather than dishing out methadone script [prescriptions]." (Karen, Age 51, Stage 1)

8.8 Overview

While receiving OST, several participants snacked on sweet foods and junk foods on a regular basis. A small number of participants snacked late at night, taking snacks or fizzy drinks to bed or waking in the middle of the night to snack. Other participants replaced meals with snacks. Some participants also expressed cravings for snack foods. At the follow-up stage, snacking among a several participants increased, while a small number of participants changed their lifestyles to improve their food consumption.

While most participants were able to manage their finances, budgeting caused difficulties for several participants. Some participants spent their monetary funds on alcohol or drugs while others lacked an effective method to budget their funds. Participants displayed feelings of anger and frustration when they spoke about managing their finances. A small number of participants experienced difficulties balancing their budgets evenly until their next instalment of state benefits or pay, spending more in the succeeding days after receiving funds.

Some OST recipients, particularly females, expressed unhappiness with their weight, eating habits or diet. Some female participants stated they had body dissatisfaction issues that caused anxiety. Weight gain only increased their anxiety and unhappiness. Stress and traumatic issues also caused limitation to consume specific types of foods. At the follow-up stage, half of the participants reported feeling low, depressed, worried and anxious during the four month interval between the study stages. Several participants stated their emotional problems affected their motivation and they lost their appetites on more than one occasion.

While receiving OST, participants experienced digestive issues such as stomach ailments, diarrhoea and constipation. Some participants reported stomach acid build-up and bile vomit as a side effect from heavy alcohol use and nausea or stomach pain from taking their daily OST prescription dose. Many participants experienced difficulty having a bowel movement and severe constipation, while a small number of participants suspected they had Irritable Bowel Syndrome.

Food storage and accessibility was limited by the type and location of participants' accommodation. If there was no access to storage facilities such as chilling or freezing foods, more monetary funds were spent purchasing foods that required less cooking time or storage time such as processed and takeaway foods. Participants who were isolated from major supermarkets felt they lacked the freedom to make food choices.

Most of the participants were aware of the dietary campaign, 'five a day' and the message behind the campaign. Some participants were unsure of the message behind the phrase and some had never heard of the campaign at all. Satisfaction with pricing was limited to specific supermarkets and the availability of the food corporation's own branded range or value range. Several participants bargain hunted for food products and shopped at various supermarkets to search for the best value.

A small number of participants who sought out dietary advice received a negative experience, leaving confused or offended. Clinicians also made assumptions of participants' food preparation skills knowledge. Rather than gaining knowledge, participants left confused with the information they were given. Participants who had literacy issues for which they were not appropriately accommodated felt particularly frustrated. One participant experienced unfair judgment from his key worker and was offended as an outcome.

Several participants suggested their GP as a source of dietary information and advice. Other participants suggested their drug worker or community services centre as the first point of contact. If dietary advice was provided as part of a support service, some participants suggested residential treatment centres or drugs services as the best option to implement these services.

Chapter 9 Discussion

9.1 Introduction

The overall aim of the current study was to improve our understanding of the dietary behaviours of people receiving opioid substitution treatment (OST) in the UK. While the major findings from the current study (Chapters Five, Six, Seven and Eight) could meet Objectives One through Five [see Chapter Four], it was also necessary to place these findings into a broader context to understand the interplay of the study's results to social phenomena and ecological factors. In order to fully explore the objectives set out in the study, the study's major findings are examined in the chapter by organising the factors into the separate environmental systems in the EST model (Bronfenbrenner, 2004, Bronfenbrenner, 1979). The EST model provides an investigation of each finding and the broader ties of the individual to ecological factors on local, regional, national and international scales. The results from the application of the theoretical model not only enhance our understanding of the study's findings, but also provide the broader context needed to identify gaps in policy, practice and research [Objective Seven]. Policy, practice and research implications are presented and discussed in the chapter.

9.2 Application of the EST model

The results of the findings in the current study are examined further to understand how food consumption patterns, nutrient intake and body composition, illicit and/or prescribed drug use, perceptions of food and diet are influenced by environmental factors. In order to meet Objective Six, the EST model is utilised in the discussion to enhance the study results by using the four system levels [the microsystem (intrapersonal and interpersonal levels), the mesosystem (organisational or institutional levels), the exosystem (community level) and macrosystem (national and international levels)] to explore social-ecological factors that may directly and indirectly influence participants' dietary behaviour [see Figure 18]. The chronosystem was an

additional level that modelled the changes over the life course and the development of dietary behaviours over time.

9.2.1 Microsystem – intrapersonal and interpersonal levels

The individual was at the centre of the model. The intrapersonal level and interpersonal level for people receiving OST included several factors that may influence food consumption patterns. As an omnivorous species, our nutritional needs must be met through a varied diet. Food neophobia was an adaptive trait for humans to distinguish between foods and to discern the toxic from the edible. However, in the modern age, food neophobia may adversely affect dietary quality (Wardle and Cooke, 2008). In the current study, positive dining experiences with the family contributed to positive connections to childhood memories when participants reflected on their childhoods. Some participants in the current study reported minor difficulties with consuming vegetables but as adults they 'can eat everything.'

As children, early eating habits may be predictive of food consumption patterns in adulthood (Kelder et al., 1994). As Rozin and Vollmecke (1986) state, "foods stimulate the chemosensory, visual, thermal and tactile senses, it is the mental representation invoked by this stimulation that is critical to humans' response...in order to identify items as either edible or not" (pg. 434). Participants who reported neglect, trauma or physical or sexual abuse as children experienced difficulties with food that influenced patterns of erratic food consumption as adults. A small number of participants expressed perceptions of disgust toward specific foods; they linked those foods to parental pressures and feeling forced to eat foods they disliked. Participants stated that as adults they experienced particular challenges with textures of food, mastication and body image. Disordered eating occurred among a small number of participants.

The age and gender of the participant may have influenced food consumption. The older generations of participants mentioned the lack of household goods such as microwaves as children. Meals were re-heated in the oven and older participants reflected on the unpleasant experience of oven-heated food. These participants emphasised the importance of sitting at the

dining table or eating together. Previous research of family eating demonstrated that children and adolescents tended to consume more healthy foods (Gillman et al., 2000) and were positively associated with consumption of fruit, vegetables and grains (Neumark-Sztainer et al., 2003) when families sat down to a meal together.

Overweight and obesity in the current study may reflect the trends of the UK general population. While mean Body Mass Index (BMI) for males in the current study was lower than the mean BMI for UK males in the general population, mean BMI measures for females were much higher than the mean BMI for UK females in the general population. For the current study group and the UK general population, the mean BMI measures exceeded the upper limit of the normal range ($> 24.9 \text{ kg/m}^2$) and fell into overweight and obese categories. BMI was much higher in the current study than other reported studies of BMI among people receiving OST. BMI among males in the current study was higher than reported mean BMI among males receiving OST in previous studies (Ferro-Lebres et al., 2012, Montazerifar et al., 2012, Alves et al., 2011, Díaz-Flores et al., 2004, Bogucka-Bonikowska et al., 2002), similar to two studies (Okruhlica and Slezakova, 2008, Kolarzyk et al., 2005c) and lower than two previous studies (Montazerifar et al., 2014, Nolan and Scagnelli, 2007). BMI measures among females in the current study were higher than all of the previous research studies that reported mean BMI among females receiving OST (Montazerifar et al., 2014, Montazerifar et al., 2012, Ferro-Lebres et al., 2012, Alves et al., 2011, Nolan and Scagnelli, 2007, Kolarzyk et al., 2005c, Díaz-Flores et al., 2004, Zador et al., 1996). BMI measures among females in the current study exceeded all reported BMI measures from the UK general population and all BMI measures reported in previous studies of females receiving OST.

Issues with body weight, dress size, body weight influenced food consumption. Several participants who experienced mental health issues lost the motivation to eat and the drive to attend to their food needs. Some female participants reported that they restricted their food portion sizes or starved themselves due to body dissatisfaction issues. They reported that their rejection of food was related to past experiences of physical or sexual abuse. At the time of the study, the female participants linked their disordered eating patterns to negative evaluations of their physical size, figure, or weight. In a review of body image research studies, researchers urged a differentiation between body dissatisfaction from body image distortion as a risk factor to

disordered eating (Stice and Shaw, 2002). Research studies of eating disorders also referred to body dissatisfaction as a negative affect regulation pathway to eating pathology (Wardle et al., 2001, Stice et al., 1998, Stice et al., 1996). A small number of male participants in the study held positive perceptions of weight gain. They made a concentrated effort to gain weight and build up their physical stature after experiencing weight loss from their drug use. In previous studies of people receiving OST or rehabilitation, weight gain was seen positively (Neale et al., 2012, Robinson et al., 2005). However, females participants in the study by Neale et al. (2012) reported feeling worried about controlling their appetites and gaining weight.

Literacy issues were a recurrent aspect of the study. Participants who were not confident about their reading skills asked to have materials read to them. Though the issue was easily resolved, the incidence of participants needing assistance with reading and writing skills exceeded the number of participants who reported special needs while in school. Literacy skills may be a factor that can affect how participants engage with materials such as dietary guidance. There is a limited body of literature that addressed the special needs of people with low literacy skills and nutrition education. A systematic review of literacy and nutrition education referred to the importance of 'health literacy', or the capacity to comprehend health information to make appropriate health decisions among people who have low literacy skills (Carbone and Zoellner, 2012). "Low literacy does not necessarily translate into [consumer] incompetence; rather a range of skills can be leveraged to meet needs competently" (Ozanne et al., 2005, pg. 265). Appropriate dietary guidance can increase health literacy, while individuals may utilise other skills (e.g. social skills and behaviour) in order to meet their own needs.

Food consumption was altered through drug use in the current study. Participants' experiences were similar to previous studies of people during heavy opioid consumption that reported disrupted dietary intake patterns (Saeland et al., 2011, Saeland et al., 2009, Himmelgreen et al., 1998, Morabia et al., 1989). Monetary funds were diverted to cover the cost of obtaining drugs. Several participants mentioned an erratic or virtually non-existent eating schedule when they heavily used drugs. Some participants shoplifted food or searched for expired food products through supermarket skips. Appetite suppression from drug use occurred for most participants. Many participants largely ignored an eating schedule and ate when they became physically weak.

Some participants who consumed alcohol above the recommended UK limits while receiving OST displayed a more erratic eating schedule and a larger variation in nutrient intake than their alcohol abstinent counterparts. Previous dietary research studies of people receiving OST reported variations in alcohol consumption (Alves et al., 2011, Kolarzyk et al., 2005b, Best et al., 1998, Zador et al., 1996); however, the current study reported excessive alcohol consumption above the recommendations. Previous studies reported excessive consumption rates of people receiving OST, particularly the UK (Senbanjo et al., 2007, Hillebrand et al., 2001, Best et al., 1998), but there were no studies of alcohol consumption and dietary behaviour among people receiving OST. In two previous studies, a sample of people from the UK general population who drank alcohol above the UK recommended limits displaced more nutrients in their diets than a sample of people who drank lower amounts of alcohol (Manari et al., 2003, Thomson et al., 1988).

Participants, while receiving OST, had particular aspects of their physical health, digestive health and mental health that affected their food consumption patterns. A large number of participants were overweight or obese, had disease conditions such as diabetes, multiple disease conditions, and mental health conditions such as depression. A small number of participants, despite having Type 2 diabetes or liver conditions, had not altered their eating behaviour to accommodate for their medical conditions. Three studies also reported higher rates of multi-morbidity in people receiving OST and more frequent use of health services to treat chronic disease conditions (Arnold-Reed et al., 2014, O'Toole et al., 2014, Cullen et al., 2009).

Digestive issues such as constipation may be influenced by dietary fibre intake. Several participants reported digestive afflictions such as stomach ailments, constipation or diarrhoea. From two previous research studies of constipation among people receiving OST, constipation was reported among a majority of patients as a common digestive issue (Yuan et al., 1998, Langrod et al., 1981). Participants in the current study also had lower intakes of NSPs; the mean actual intake was approximately half of the UK nutrient recommendation. In two previous studies of nutrient intake of people receiving OST, Zador et al. (1996) and Kolarzyk et al. (2005a) reported low dietary fibre intake below the nutrient recommendations of their respective countries. However, Kolarzyk et al. (2005a) reported adequate dietary fibre intake at the 4-year follow-up.

Food consumption patterns may have changed due to participants' circumstances. Several participants snacked late at night or reported cravings for snack foods or sweet foods. Craving for sweet foods was reported in previous literature of people receiving OST (Robinson et al., 2005, Zador et al., 1996). At the follow-up stage, snacking among several participants increased. The increase in snack food and sweet food consumption may be related to the emotional issues participants experienced, particularly with issues such as stress that caused anxiety. A small number of participants experienced changes in their living environment such as having a child returned to the home or the loss of employment and a steady source of income. Previous literature among general population samples associated stress with modification of behaviours that affect health (Stephoe, 1991), perceptions of individuals' own eating patterns and increased food intake (Oliver and Wardle, 1999) or the inability to effectively cope which resulted in increased snacking (O'Connor and O'Connor, 2004).

Consumption of specific foods and number of eating events may have influenced nutrient intake. High intakes of saturated fat (SAT) and non-milk extrinsic sugars (NMES) were reported in the current study. Overall sugar intake in the current study fell well below the sugar intake reported in the study by Zador et al. (1996), but still exceeded the UK recommendations, particularly for daily consumption of non-milk extrinsic sugars (NMES). Saturated fat (SAT) intake in the study also exceeded the UK dietary recommendations for males and females in the current study. Kolarzyk et al. (2005a) reported higher SAT consumption among females receiving OST at the follow-up stage, but noted that poly-unsaturated fat consumption (PUFA) increased as well. In the current study, SAT contribution was also linked to consumption of full-fat dairy products, while both SAT and NMES intakes may have been influenced by snacking events and the consumption of sweet and savoury processed foods.

Nutrient intake patterns in the current study demonstrated similarities to the UK general population. Salt intake, particularly among males in the current study, exceeded the recommended salt intake of 6 g/day. The salt intake of the UK general population also exceeded the recommendation. Iron intake in females in the current study and females in the UK general population were lower than the nutrient recommendations. However, iron intakes among females in the current study fell well below the observed intakes among UK general population females.

Kolarzyk et al. (2005a), Zador et al. (1996), Gambera and Clarke (1976) reported low iron intakes among females receiving OST and Díaz-Flores et al. (2004) reported low Fe serum concentrations among females receiving OST. Care may be needed to ensure adequate intake of iron-enriched foods in females receiving OST and females in the UK general population. A further reduction of salt intake may be required in the UK population overall.

Cooking skills in the current study population were varied and diverse. Many participants talked about their mother's ability to cook and the dishes they remembered. Some of the participants who held positive recollections of food as children tried to re-create their favourite dishes as adults. Several participants as young adults experienced new enablers to their food consumption patterns such as the support of family, partner or friends by cooking together or for one another. New barriers such as lack of cooking/food knowledge, financial constraints, loss of accommodation, physical abuse and trauma, or homelessness posed potential problems to food accessibility and affordability. While several participants were able to cook as adults, many of them lacked the motivation or interest to cook for themselves. Some participants stated they were unable to cook (lacked cooking knowledge) or were afraid to cook (issues related to fear of electricity or the use of high temperatures while cooking). From previous research, cooking practices and their influence on food choice and dietary quality are not well understood (Short, 2003, Grunert, 2002, Caraher et al., 1999). However, a cooking skill measure was developed by Hartmann et al. (2013) as a potential reliable and valid instrument to assess cooking skills. This instrument can be utilised in future research to understand cooking skills and the role they play in food choice, particularly in the current study population that appeared to have a variety of skill levels.

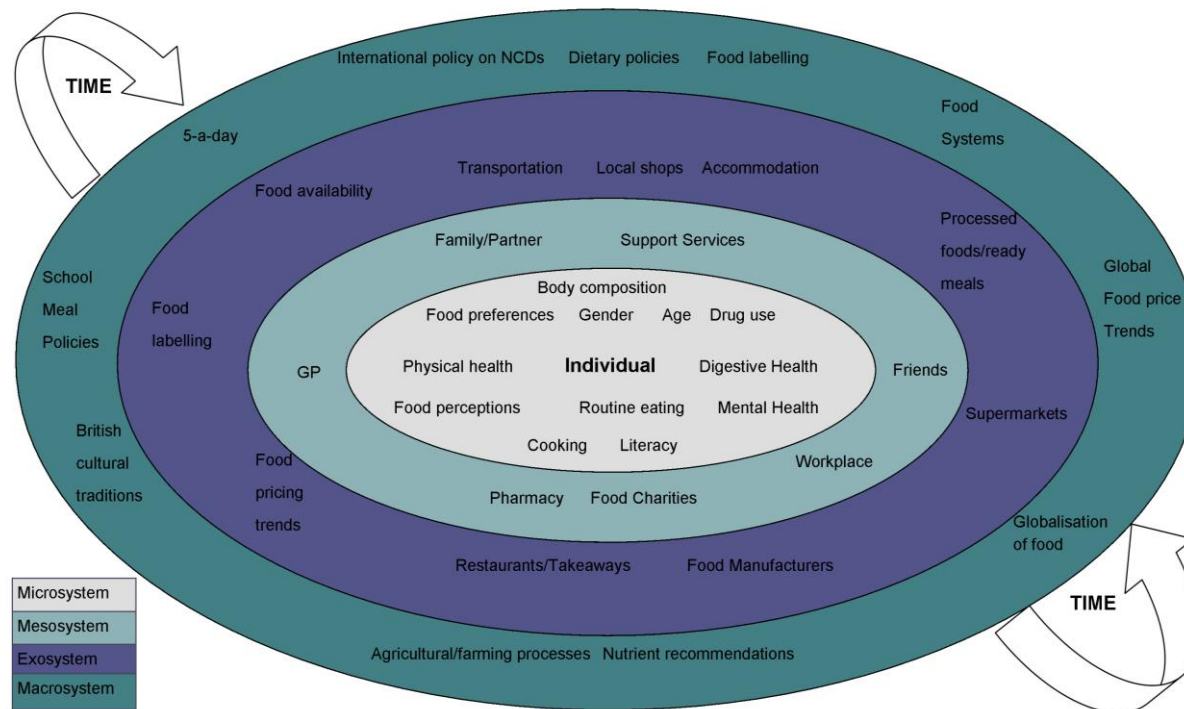


Figure 18 EST model on dietary behaviours of people receiving OST

9.2.2 Mesosystem – organisational and institutional levels

In the home, food and eating traditions took precedence among some participants' families. Depending on participants' experiences as children, their food perceptions were tied to images of their family, particularly their mothers or grandmothers. A majority of the participants were given school dinners and had at least one meal a day. Fussy eaters among the participants reflected on the difficulty of having to eat a meal. Some of the participants recalled difficulties and awkward feelings when eating as a family due to fussy eating or discomfort around family members. One participant in particular came to dislike the smell of brussel sprouts as an adult after repeated exposure as a child to a heated debate with his father about finishing his plate. Previous research studies of the parental influence and children's food intake in the UK reported a negative association between parental control and children's fruit and vegetable consumption (Wardle et al., 2005) and a negative association between food neophobia and fruit and vegetable intake (Cooke et al., 2006). The family dining experience could become a traumatic event if the parents' and the children's emotions become involved, debating about eating everything on the plate.

The presence of a partner at home may influence an individual's eating pattern. The presence or absence of a partner or family can change the cooking and consumptions patterns in the household (Kremmer et al., 1998) while eating together with companions can influence food intake (Young et al., 2009). People receiving OST may also be subjected to similar changes in their food consumption behaviour, particularly with the presence of children in the household. Drug-using parents were more likely to shield their children from drug-related harms and provide them with food, clothing and shelter as their first priorities (Rhodes et al., 2010, Richter and Bammer, 2000, Klee, 1998). Some participants with partners or children consumed meals regularly, shopped on a regular basis and occasionally cooked together.

Depending on the era participants were in school, they may have experienced the influence of the abolishment of school lunches by the local education authorities in 1980 and the privatisation of school lunches by private corporations (Rawlins, 2009). Influences from these changes in school canteens and the eating environment may have influenced participants' childhood food

accessibility. While older generations of participants may have had stable access to nutritionally balanced school lunches that were prepared by the local education authorities, the younger generations may have experienced the effects of privatising school lunches and availability of foods prepared by private corporations. When the participants were young and attending school, they had access to at least one major meal each day. Several participants lived in a single-parent household. Participants with a working parent in a single-parent household reported that they had limited access to food in the evenings during the work week; these parents were unavailable to provide an evening meal due to longer shifts or multiple jobs. Participants who relied on school dinners as their primary meal of the day may have been linked to the eating practices and the effects of policy changes in schools at the time.

Schools, young offender institutions, prisons also offered food preparation skills training to participants. Some participants reported they attended home economics classes in school and learned basic cooking and baking techniques. Young offender institutions and prisons gave cooking opportunities and kitchen duties to some participants. A research study that investigated prison food service reported that prisons offered general education classes that incorporated cooking, and on-the-job training schemes in the prison kitchens (Edwards et al., 2009).

Food charities provided access to food when participants had restricted access, such as periods of heavy drug use. However, the function of food charities began to change after participants began receiving OST. Participants frequented food charities for food on a regular basis during heavy drug use. When participants began receiving OST, access to food charities became a social event to meet with acquaintances, rather than necessity. Many of the participants were aware of the charities, but only a small number of participants frequented them while receiving OST. A small number of participants expressed their dislike of the charities due to meeting former drug acquaintances.

Hostels provided direct access to food by preparing meals for residents. Some hostels catered to residents, other hostels encouraged food preparation in small teams of residents. Access to meals may be beneficial or disadvantageous, depending on participants' perceptions of the food. A small number of participants who lived in hostels had access to a canteen to purchase

subsidised food. The participants living in a hostel had access to two meals a day at the canteen. However, all of the participants living in a hostel refused to eat in the canteen due to the poor quality of the food and its preparation. Food in hostels may be one of the most economical and important resources for people who live there to acquire foods; previous research of homeless women's eating patterns reported that 85.5% of homeless women consumed food from the hostel canteens (Bunston and Breton, 1990). For participants living in the hostels, poor food quality can become a barrier to food acquisition if the stable food source does not meet participants' expectations.

The workplace offered opportunities to learn food preparation skills training for participants who were interested in working the kitchens. A small number of participants trained to cook through employment opportunities in pubs and cafes. A small number of participants who worked in an office environment had access to subsidised food through the corporate canteen or vending machines. Two studies of workplace canteens reported healthier eating habits and food choices among employees who ate lunchtime meals at the canteen (Raulio et al., 2010, Roos et al., 2004). Catering services may be an important outlet to promote healthy eating habits provided the services follow dietary recommendations.

The medical clinic, pharmacy and support services as examples of places to gather dietary or medical information and advice. Participants asked medical practitioners for dietary advice or received referrals for a nutritionist. They also received further information and advice about their digestive ailments from their pharmacists. Some participants felt they could ask their key worker for more information. While some of the diabetic participants were referred to a nutritionist or diabetic nurse for further information, they were given information that was not suitable to their needs. Participants with eating issues that were connected to traumatic experiences reported the nutritional information was too generalised and inappropriate for their needs. Participants with learning difficulties and literacy issues reported the nutritional information they were given caused confusion. A small number of participants also felt offended by the behaviour and attitude of their key workers when they approached them for dietary advice.

9.2.3 Exosystem – the community level

Supermarkets altered food acquisition by location and food product pricing. The accessibility of major supermarkets and local shops from the location of a participant's home may alter food consumption patterns. When supermarkets were difficult to access without transportation, participants spent more of their funds buying food products from the local shops or takeaways. Participants who were able to benefit from a variety of food choice by living in a more centralised area, shopped at different stores and assessed price comparisons to achieve better value. Previous research studies of supermarket locations and healthy food choices reported that access to healthy food is car dependent (Burns and Inglis, 2007, White et al., 2004). Participants in the study had a potentially long journey by bus or foot to carry groceries from supermarkets that were 1 mile or more in distance from their homes.

Supermarket food prices and product ranges also determined food affordability. Most participants thought the food pricing varied in supermarkets, but the availability of the supermarket's own branded ranges provided more access to food variety at a price range that was within participants' financial means. Own brand ranges were marketed as low-cost alternatives in the 1970s, however own brand ranges have become an important factor to meet consumer demands for food products such as ready meals, prepared fresh foods and snacks (Burch and Lawrence, 2005) and the nutrient composition was found to be similar to or better than branded goods (Cooper and Nelson, 2003).

Accommodation was a central determinant to food acquisition and storage patterns. Some of the participants who were living in hostels had no access to storage facilities. Participants who could not refrigerate or freeze food reported that they purchased fast food, ready meals and processed food products. In an Australian study, poor dentition and lack of food storage and cooking facilities were reported barriers to food security in people who frequented soup kitchens (Wicks et al., 2006). In the current study, food quality at the hostel canteens was poor and participants felt resistant to pay to eat what they called 'bad food.' Other hostels that had a shared cooking scheme allowed participants to cook food in turns for everyone. The small number of participants living in this type of hostel enjoyed cooking and eating the food.

9.2.4 Macrosystem – the national and international levels

Global food commodity prices from 2004-2009 rose in the areas of cereals, vegetables, oils, meat, seafood, sugar, bananas and oranges, however energy dense foods such as fizzy drinks and processed foods were more resistant to these rising trends (Nabipour et al., 2014). As these price trends become reflected in food prices, consumers may purchase fizzy drinks and processed foods over fresh foods and drinks that are energy dense, but less nutritious (Brinkman et al., 2010). Costs of living could increase, directly affecting people with limited incomes (Headey and Fan, 2008). With regard to the participants, with their limited financial means, rising food prices potentially cause more difficulty to budget for food shopping by reducing food affordability and restricting the variety of food in the diet.

Agricultural processes were also incorporated into the food product processing chain. The traditional methods of agriculture caused damage to the environment and soil erosion to occur (Montgomery, 2007, Pimentel et al., 1995). The geochemical makeup of the soil in varying regions can also cause variation in the mineral intake of fruit and vegetables. Selenium is a prime example of the steady decline in consumption due to the wide variation of soil contents in various regions (Rayman, 2000, Rayman, 1997). Selenium intakes of males and females in the current study fell well below the nutrient recommendation. Participants become subject to the direct effect of the agricultural processes as consumers of food products.

Food system changes may alter consumer's food accessibility over time. The globalisation of fruit and vegetable imports and exports produced less seasonal dependence (Kearney, 2010). Urbanisation in the past 50 years caused a disconnection from the seasonal patterns of foods as primary food production decreased (WHO and FAO, 2003). While food accessibility increased due to global food production and globalisation of food products, the sustainability of resources to produce all-year availability of food has created major challenges to the environment (Foster et al., 2014). As Dibb et al. (2006) reported, there are more consumers interested in buying seasonal food products which would support sustainability, but consumers have a vague definition of the seasonality of produce. Ultimately, the effects of the food system changes

through overexploitation of material resources such as land, water and energy to produce food would affect consumers' food accessibility.

Government led recommendations such as nutrient intake recommendations and the salt reduction programme affected participants directly (Department of Health, 2011b, Scientific Advisory Committee on Nutrition, 1998). Efforts to reduce sodium in food products, affected the levels of sodium consumed by consumers without real awareness of the changes to their diets. 'Five a day' and the Change4Life campaign (<http://www.nhs.uk/change4life/Pages/five-a-day.aspx>) which promoted awareness to consume vegetables and fruit, live longer and move more, was presented by the media through various channels such as television, news sources and the internet. While many participants heard of 'Five a day' as a campaign to increase fruit and vegetable intake, they were unsure of the fine details of the campaign. Several participants were not sure what the phrase meant or had not heard of the phrase at all.

Food labelling and calorie information may influence dietary intake. In 2009, the Food Standards Agency introduced a scheme to add calories to menus in the UK after a similar scheme was introduced as a law in New York state in the US (Benelam, 2009). Larger, chain restaurants and eating establishments were able to volunteer to add calorie information to their menus, increase physical fitness opportunities and aid in cessation practices by pledging to the government's Public Responsibility Deal (<https://responsibilitydeal.dh.gov.uk/>). A research study by Alder (2008), found some of the larger fast food chains and restaurants did not offer detailed nutrition leaflets, or information was available on food trays after food was purchased. In the case of the current study population, participants may be less aware of their dietary intake if calorie information or food labelling information is unavailable or difficult to understand.

Food practices as a cultural tradition may proliferate through generations and over time. Transmission of food preparation from one generation to the next can also imbue cultural knowledge and identity (Scholliers, 2001) while the food itself is symbolic of culture and society (Kittler and Sucher, 2000). Food knowledge in the current study was largely transmitted through the dissemination of cooking and food culture from one generation to the next. Most participants reported that they learned to cook from watching their mothers, which coincides with data from

the UK general population (Caraher et al., 1999). It was unclear if any of the participants learned to cook from their parents through formal teaching. Several participants stated they cooked dishes they remembered from their childhood such as spaghetti Bolognese, Shepard's pie, Sunday roast, fish and chips or stews. A small number of participants learned to cook other cuisines from relatives or friends and incorporated these dishes in to their cooking repertoire. One participant reported that he used cooking shows on television or recipes from cookbooks as a cooking reference.

School meal policies in the UK changed over time, which directly altered the eating environment at schools. During and after the Second World War, the Butler Education Act of 1944 introduced a plan to increase the school leaving age to 15 years, and provide free school meals to all school children (Burke, 2002). However, school meals changed due to the introduction of the 1980 Education Act, removing the responsibility of school catering services from local education authorities to private catering services which came to dominate the production of school meals (Valentine, 2000). School meals shifted from freshly prepared meals to ready-made meals that were shipped from a separate manufacturing site to schools (Rawlins, 2009). In the year 2000, overweight and obesity rates in children began to increase, leading the government to regulate the nutritional standard of school food (Nelson, 2011). In 2005, the School Food Trust was established to govern catering provision at schools and raise the dietary and nutritional quality of foods (Department of Education, 2014, Nelson, 2011). Participants who grew up during these periods of change may have learnt various dietary behaviours from the influence of their school's eating environment.

9.3 Strategies to address the dietary and nutritional needs of people receiving OST

From the results of the current study, dietary advice is warranted for people receiving OST. However, further research and formation of strategies to improve the dietary needs of people receiving OST may be beneficial. The seventh study objective aims to contribute to potential

policy, practice and research implications that could improve our understanding of the dietary needs of people receiving OST and the potential strategies that could be employed to inform future research and policies.

9.3.1 Policy implications

Currently, there are no diet or nutrition policies specific to people receiving OST. While dietary policies and recommendations targeting the general population exist, these recommendations have not reached the current study population. Moreover, complex circumstances among people receiving OST create a difficult situation to apply a generalised policy to a population that requires specialised needs. Dietary advice could be implemented through social care needs to target people who are interested in receiving advice and willing to incorporate changes to their food consumption.

Health promotion with regard to healthy food choices, food preparation and food acquisition could provide an amenable approach to improve dietary lifestyle. While harm reduction and recovery are important factors to achieve abstinence, the role of nutrition in the risk of development of NCDs also needs to be addressed. People receiving OST may be particularly vulnerable to NCDs due to the prevalence of multiple health conditions (O'Toole et al., 2014, Arnold-Reed et al., 2014) and the risk of rapid weight gain upon commencement of OST (Emerson et al., 2009, Okruhlica and Slezakova, 2008). Harm reduction from preventable health conditions through diet and nutrition could be a potential factor to improve recovery capital by improving dietary lifestyle patterns and physical health.

9.3.2 Practice implications

Health promotion and disease prevention methods may prove helpful while people are receiving OST. A food questionnaire or set of questions to assess dietary lifestyle and cooking skills could provide a method to assess their existing skills set and build a basis to provide appropriate guidance. An effective method may be to intercept and prevent rapid weight gain on

commencement of OST by conducting a dietary lifestyle assessment. From the current study, participants were interested in receiving dietary advice. The participants who were referred by clinicians were those who were obese or were diagnosed with medical conditions such as Type 2 diabetes. A set of dietary questions may be appropriate to identify participants who are interested in diet-related skills training and knowledge acquisition.

Digestive health issues were a major problem for participants in the current study. Rather than relying solely on prescribed medication, dietary advice targeted to aid in gut health could also be incorporated to improve dietary intake. Information to reflect changes that influence digestive health could be an effective method to approach behaviour change in the current study population. Long-term issues made some participants feel embarrassed or frustrated while for others it impacted their self-esteem. Stomach and bowel issues were particularly problematic. Participants reported that prescribed laxatives or fibre granules to treat constipation were ineffective. An intervention at the commencement of OST to address digestive health problems through dietary education may prove to be effective. This is in line with the recommendations of a previous study by Winstock et al. (2008) to detect and respond to common health issues.

Cooking skills can enhance consumers' understanding of a healthy diet, provide a sense of empowerment to take control of dietary intake, and allow consumers to participate in social norms where food culture plays a central role (Lang and Caraher, 2001). According to several participants, cooking skills were largely acquired from watching parents at home. However, multiple health conditions created a barrier to food choice for some participants due to dietary restrictions. While watching parents cook food and cooking dishes from memory may increase confidence in the kitchen, practical skills could be further improved through cooking and food preparation. By increasing confidence in basic cooking skills, participants could have diverse food choices available to them with fewer restrictions to make those choices.

The acquisition of food preparation knowledge may improve dietary behaviour and intake. Creating an environment to learn cooking through hands-on training could be helpful to teach practical food preparation methods. In some instances, innovation may be necessary to accommodate for participants' circumstances such as lack of storage facilities. Wicks et al. (2006)

also recommended investigating practical solutions to access affordable healthy foods for people without kitchen facilities. When clinicians and practitioners give dietary information and nutritional advice, participants will then have the resources to implement the information they receive by utilising their food preparation skills.

Budgeting and management of finances may improve food shopping efficiency. A study by Nelson et al. (2002) reviewed food baskets and expenditure to assess for a low cost, but acceptable minimum income standard and dietary adequacy in low-income households. A small number of participants in the current study attempted to save money by searching supermarket skips for expired food products or shoplift for food. As part of an intervention, education on budgeting, with a focus on efficient food shopping that accounts for participant's financial means to assess total expenditures against food expenditures. Education may be further enhanced by cooking and food preparation education, by expanding the use of ingredients that maximise dietary intake but accommodate for a restricted budget.

Aftercare support services may be useful to provide continued access to dietary advice and guidance after information sessions or training. Several participants reported that they were referred to a nutritionist for further dietary advice and information. After implementation of training skills or guidance session, it may then be important to consider further support such as aftercare to ensure that issues are covered effectively to obtain lasting results. Furthermore, if participants have further enquiries, they could contact a support service to receive advice for their digestive health conditions, dietary intake or food preparation methods. The implementation of aftercare was also recommended in a food preparation intervention study conducted by Wrieden et al. (2007).

9.3.3 Research implications

Dietary intake among people receiving OST requires further research in a multitude of areas to inform potential policies and interventions. Currently, limited evidence in the UK exists. While previous studies from other countries inform the field as a whole, food consumption patterns may

differ by region (Rajs et al., 2004). It is difficult to understand the extent to which food consumption varies nationally, and even regionally. If research studies could determine specific regions that require more support, local support services can be established to target the regions in need.

The rates of overweight and obesity among people receiving OST in the UK warrant further research, particularly with the higher rates as evidenced in the current study. Previous research also reported evidence of overweight and obesity among people receiving OST in the US and Poland (Okruhlica and Slezakova, 2008, Nolan and Scagnelli, 2007, Kolarzyk et al., 2005a) while a previous conference paper presented increasing rates of obesity among people after commencement of OST in the US (Stein et al., 2008). With higher rates of overweight and obesity in the UK general population (Health and Social Care Information Centre, 2014), and particularly due to the higher rates of obesity and risks to multi-morbidity according to SES (He et al., 2014, HM Government, 2014, Public Health England, 2014, Barnett et al., 2012, Salisbury et al., 2011), research is needed to investigate these rates in people receiving OST.

Research on alcohol consumption and dietary behaviour in people receiving OST in the UK may be needed. A large degree of variance was reported in energy intake from macronutrients among participants who consumed alcohol above the recommended UK limits. People receiving OST who consume excessive amounts of alcohol may be at risk of dietary and nutrient deficiencies due to erratic food consumption patterns. Increased intake of alcohol was not observed in dietary studies of people receiving OST in countries outside of the UK (Alves et al., 2011, Kolarzyk et al., 2005b, Zador et al., 1996). While research into excessive alcohol consumption among people receiving OST in the UK has been undertaken (Senbanjo et al., 2007, Hillebrand et al., 2001, Stastny and Potter, 1991), research of the influence of excessive alcohol consumption on dietary behaviour among people receiving OST is not well studied. High alcohol consumption can interfere with the body's absorption of thiamin through the intestinal tract and make it difficult to absorb thiamin through foods (Forsander, 1998, Zimatkin and Zimatkina, 1996). Alcohol also induces a higher rate of urine excretion which may contribute to thiamin deficiency as it is excreted more rapidly than absorbed. Thiamin deficiency and undernourishment in general is prevalent in alcohol dependence due to malabsorption (Manari et al., 2003, Green, 1983). Further research into alcohol consumption in reference to dietary and nutrient intake of people receiving OST in

the UK may be warranted to understand the influence of alcohol consumption on dietary behaviour in the study population.

Research in areas such as shopping experiences and participants' intentions to buy food could provide insight as to why specific food choices are made. Previous research in studies of low-income households in the UK suggested that motivation to consume fruit and vegetables may play a more central role than barriers such as accessibility and affordability of fruit and vegetables (Dibsdall et al., 2003). Further research may be warranted to learn about participants' shopping experiences through environmental modifications. Weatherell et al. (2003) reported positive attitudes of UK consumers toward local food systems and local food initiatives. The efficacy of improving fruit and vegetable consumption could be conducted by environmental changes such as the introduction of farm stands. A longitudinal pilot study measured fruit and vegetable intake after the introduction of farm stands in low-income communities and found significant increases in fruit and vegetable consumption (Evans et al., 2012). The study highlighted the awareness of farm stands in the local community and participants bought local produce after the intervention. Further research could be conducted to understand participants' awareness of alternative food systems.

From previous research, cooking practices and their influence on food choice and dietary quality are not well understood (Short, 2003, Grunert, 2002, Caraher et al., 1999). However, a cooking skill measure was developed by (Hartmann et al., 2013) as a potential reliable and valid instrument to assess cooking skills. This instrument could be utilised to assess the current study population to understand the variation in cooking skills experience to develop an appropriate cooking intervention. Also, future research studies could assess how cooking skills and dishes differ by age and/or cultural traditions to add to the debate regarding the decline of cooking skills or its transformation.

Food expenditures could also provide insight to understand the financial breakdown of total expenditures to determine the necessity of a dietary intervention. Rather than measure household size to assess per capita expenditure, adult equivalence scales given to members of the household by age and gender can account for differing household needs and allow for inter-

household expenditure comparisons (Sabates et al., 2001). With the varying socio-demographic backgrounds of participants and their households, the method suggested by Sabates et al. (2001) may be a comprehensive approach to assess food expenditures in the current study population.

Multi-morbidity is also an area with little empirical evidence for people receiving OST in the UK. The rates of chronic disease conditions in people receiving OST can potentially determine the extent of NCDs and the multi-morbidity rates that already exist in the population. Three recent studies by (Arnold-Reed et al., 2014), O'Toole et al. (2014) and Cullen et al. (2009) indicated that chronic health conditions may persist among people who use drugs. While results from the current study indicate multiple health conditions among participants, there is not enough evidence to determine the situation among people receiving OST in the UK.

9.4 Fulfilment of research objectives in the investigation

Seven objectives were utilised to examine the relationship between people receiving OST and their dietary behaviour. The major findings of the study are chapter specific and were discussed within each respective chapter (Chapters Five through Eight). The empirical findings were synthesised to meet the research objectives.

Research Objective One:

1. To explore food choices, food consumption patterns and processes of food acquisition
 - a. **Complex circumstances may create barriers to food sufficiency:** The majority of the participants ranged in age from 22-53, single, held no employment, lived in social housing and received state benefits. Several participants were receiving cash in hand from other sources.
 - b. **Food consumption was shaped by childhood experiences with food and family eating:** Participants reported both positive and negative food experiences. Negative experiences had lasting effects that affected adulthood food consumption.

- c. **Food consumption patterns were altered by environment:** After participants moved out of the home, they had difficulties with food acquisition and cooking due to financial constraints, lack of food preparation knowledge or lack of interest.
- d. **Food storage and accessibility were affected by accommodation:** Participants who were homeless and living in hostels had limited access to storage facilities.

Research Objective Two:

- 2. To explore nutrient intake and body composition
 - a. **Non-starch polysaccharides (NSPs) intake was low:** Intake of NSPs was well below intakes observed in the UK general population and reached approximately half of the nutrient recommendation.
 - b. **Sodium intake was high:** Sodium intake was higher than the recommended intake. Recommendations may be necessary to reduce sodium intake in people receiving OST.
 - c. **Iron intake among females was low:** Iron intake among females in the study was well below the average intake observed in the UK general population. Recommendations may be necessary to prevent iron-deficiency anaemia in females receiving OST.
 - d. **Non-milk extrinsic sugars (NMES) intake was high among alcohol consumers:** Dietary energy from NMES intake exceeded the UK nutrient recommendations among alcohol consumers in the study.
 - e. **Saturated fat intake (SAT) was high:** Saturated fat intake among both groups, particularly males, exceeded the UK nutrient recommendations.
 - f. **High rates of overweight and obesity:** A large number of participants had high Body Mass Index (BMI) values above the upper limit of the normal range ($> 24.9 \text{ kg/m}^2$).
 - g. **Females reported higher obesity measures than males in the current study:** Only one female had normal BMI and body fat measurements.
 - h. **People receiving OST may be at higher risk to NCDs:** Higher overweight and obesity rates over the long term may cause higher risks to obesity-related morbidity.

Research Objective Three:

3. To investigate influences between patterns of illicit and/or prescribed drug use, and food consumption patterns
 - a. **Food acquisition was influenced by heavy drug consumption:** Several participants committed crimes to acquire food or rummaged through supermarket skips to find expired stock.
 - b. **Food consumption was altered by heavy drug consumption:** Many participants chose to eat snacks and high energy foods.
 - c. **Appetite suppression and binge eating occurred during heavy drug consumption:** Many participants did not feel hungry. Withdrawal effects from drugs such as cocaine or amphetamines resulted in binge eating for some participants.
 - d. **Frequent sweet food and junk food consumption occurred while receiving OST:** Several participants reported snacking on sweet foods and junk foods while receiving OST.
 - e. **Snacking events increased at the follow-up stage of the study:** Despite consuming two or more meals a day, snacking frequency increased among several participants at the follow-up stage.
 - f. **Emotional issues affected food consumption at the follow-up stage:** Several participants lost their appetites due to emotional issues.
 - g. **Stomach and bowel issues affected food consumption during heavy drug consumption and OST:** Many participants had difficulty eating a meal due to stomach ailments, diarrhoea and constipation during heavy drug consumption and while receiving OST.

Research Objective Four:

4. To investigate influences between patterns of illicit and/or prescribed drug use, and nutrient intake

a. Increased alcohol intake influenced energy intake of people receiving OST:

Participants who consumed larger amounts of alcohol had a more erratic eating schedule.

Research Objective Five:

5. To investigate how perceptions of food and diet affect food choices and food consumption patterns

a. Body dissatisfaction issues among females: Females expressed unhappiness with their body weight, eating habits or diet.

b. Loss of motivation to eat: Several participants lost the motivation to eat and the drive to acquire food when they experienced mental health issues.

c. Partner and families improved food consumption patterns: Participants with partners and/or children reported more stable food patterns. Partners could cook for the household while children provided a reason for participants to cook.

d. Longer distances from supermarkets: Some participants did not have private transport and were not able to access a full range of food choices.

e. Food pricing and supermarkets' own branded ranges: Satisfaction with pricing was limited to specific supermarkets and the availability of the food corporation's own branded range or value range.

f. Bargain hunting for best value: Several participants bargain hunted for food products and shopped at various supermarkets to search for the best value.

g. Dietary awareness: Most of the participants were aware of the dietary campaign, '5-a-day' and the message behind the campaign.

h. Nutritional awareness: Several participants were unsure of nutritional knowledge such as calorie intake.

i. Negative experiences with dietary practitioners: A small number of participants who sought out dietary advice received a negative experience, leaving them confused or offended.

- j. **Dietary information was not in the appropriate format:** Participants who had literacy issues for which they were not appropriately accommodated felt particularly frustrated.
- k. **Methods to seek out dietary and nutritional advice:** Several participants suggested their GP as a source of dietary information and advice. Other participants suggested their drug worker or community services centre as the first point of contact.
- l. **Recommended dietary and nutritional advice service:** Some participants suggested residential treatment centres or drugs services as the best option to implement these services.

Research Objective Six was achieved through the application of Ecological Systems Theory (EST) (Bronfenbrenner, 2004):

- 6. To investigate how physical, social and/or environmental factors affect the food acquisition and consumption patterns

There was no previous application of a theoretical framework to investigate the dietary behaviour of people receiving OST. The following application of the findings to the EST model is unique to the current study and present indicative results by investigating the ecological factors that may influence the major findings. The factors from each system of the EST model are designed to provide a deeper analysis and pinpoint areas that require further attention, through policy, practice or research implications. The adapted EST model informed the current study's recommendations. These implications are discussed later in the current chapter.

Microsystem: In the current study's findings, the interpersonal and intrapersonal levels consisted of the following factors that may affect dietary behaviour:

- a. **Childhood food neophobia may affect dietary quality:** Food neophobia, while an adaptive trait for human survival, may adversely affect dietary quality in the modern age through restriction of dietary intake (Wardle and Cooke, 2008).

b. Negative childhood experiences affected food consumption as adults:

Childhood eating habits may be predictive of food consumption patterns in adulthood (Kelder et al., 1994).

c. Age: The generation of the participants may influence food consumption through cultural food traditions.

d. Gender: Females expressed dissatisfaction with their bodies, weight or dress size. A small number of males held positive perceptions of weight gain.

e. Literacy: Literacy skills influenced how participants engaged with dietary materials.

f. Drug use influenced food acquisition: Several participants searched supermarket skips for expired food products and shoplifted food.

g. Physical health during OST: A large number of participants were overweight or obese and had multiple disease conditions.

h. Mental health during OST: Emotional issues suppressed appetites and interfered with the motivation to eat.

i. Digestive health: Digestive health issues during heavy drug consumption may be carried over and persist while on OST.

j. Food preparation skills: Most participants learned cooking through observation and food preparation skills were varied and diverse in the group.

Mesosystem: The organisational and institutional levels consisted of the following factors that are necessary to understand the dietary behaviour of people receiving OST:

a. Home: Childhood food perceptions were tied to images of the family, particularly mothers or grandmothers. Partners and/or children in adulthood influenced more stable food consumption patterns.

b. School: School dinners provided at least one major meal during the day. Some participants attended home economics classes in school to learn cooking and baking techniques.

c. Young offender institutions: A small number of participants volunteered to cook in the kitchens and learned all of the basic cooking and baking skills.

- d. **Prison:** Prisons also offered basic cooking and baking skills in the kitchens.
Some prisons also offered courses on healthy eating.
- e. **Workplace:** Catering services and food vending machines offered meal accessibility and subsidised food.
- f. **Food charities:** Participants relied on food charities when using drugs heavily.
While on OST, food charities became a social gathering place for some participants.
- g. **Hostels:** Homeless participants living in hostels may be heavily dependent on hostel canteens.
- h. **Medical clinics and pharmacies:** Participants may seek out dietary information or advice from medical services.

Exosystem: The community level consisted of the following aspects to consider in participants' dietary behaviour:

- a. **Supermarkets:** Long distances from supermarkets posed problems for some participants to access food.
- b. **Supermarket food prices and own branded ranges:** Supermarket own branded ranges provided more access to food variety at a price range that was within participants' financial means.
- c. **Accommodation:** Food accessibility was influenced by the ability to store, freeze and chill food products.

Macrosystem: The national and international levels consist of the following factors that may influence participants' dietary behaviour:

- a. **Global food commodity prices and price trends:** Global food commodity prices and price trends may influence participants as prices of food rise and fall.
- b. **Agricultural processes:** Agricultural processes such as the geochemical makeup of the soil can influence participants' mineral intake when purchasing fruit and vegetables.

- c. **All-year availability of food products:** All-year availability of foods may impact participants' accessibility by creating major challenges to environmental sustainability.
- d. **Food system changes:** Any changes to the food systems will ultimately have an effect on consumer's food accessibility.

Research Objective Seven:

- 7. To identify strategies for supporting dietary and nutritional needs

The findings from Objectives One through Five were applied to the EST model to understand social-ecological influences that were directly and indirectly involved in participants' dietary behaviour. The factors from the EST model were organised into the environmental systems to guide policy, practice and research recommendations in the current study.

9.4.1 Policy implications

While there is no policy specifically addressing dietary and nutritional needs of people receiving OST, previous research studies and the current study recommend nutritional education, interventions and/or dietary guidance (Neale et al., 2012, Kolarzyk et al., 2010, Zador et al., 1996, Gambera and Clarke, 1976). The current study used empirical findings to show that the current drug strategy agenda is not focusing on dietary and nutritional needs. Ignoring the potential risk factors to NCDs in people receiving OST may delay and/or inhibit their accrual of recovery capital and their potential to reach abstinence.

9.4.2 Practice implications

Potential practice implications that could be developed further (and possibly into interventions) are:

- a. **Dietary lifestyle assessment:** A questionnaire or a set of questions could provide a method to assess for an existing skill set (cooking or food preparation). Appropriate guidance can be built upon participants' preferences.
- b. **Digestive health advice and related health advice:** Participants may require specialised care for digestive health issues and how it impacts mental health.
- c. **Improvement of health literacy:** Provide information to participants that is appropriate for their needs to help them make informed health decisions.
- d. **Practical skills:** Food preparation skills and budgeting strategies can improve human and cultural capital.

9.4.3 Research implications

Recommendations for future research among people receiving OST include the following topic areas:

- a. **Regional variations in dietary intake:** Research findings may differ from country to country. Further dietary research is necessary among people receiving OST in the UK.
- b. **Rates of overweight and obesity:** Higher rates of overweight and obesity among people receiving OST were reported in previous studies among other countries (Okruhlica and Slezakova, 2008, Stein et al., 2008), but further research is needed in the UK.
- c. **Alcohol consumption rates and dietary intake:** Excessive alcohol consumption was not a significant aspect of other dietary studies of people

receiving OST in other countries (Alves et al., 2011, Kolarzyk et al., 2005b, Zador et al., 1996). While one study indicated excessive alcohol consumption in a dietary study of people receiving OST in the UK (Best et al., 1998), research is needed to understand alcohol consumption rates in the context of dietary intake of people receiving OST in the UK.

- d. Food acquisition and shopping experiences:** Research on the awareness and availability of local food systems or alternative food systems (i.e. farm stands, farmers' markets) could be conducted in the UK.
- e. Cooking practices:** A new cooking measure developed by Hartmann et al. (2013) may provide new findings to assess cooking skills among people receiving OST to build an appropriate food preparation intervention.
- f. Food expenditures:** Research to assess household expenditures and food expenditures, similar to the research method of Sabates et al. (2001), to assess the potential of a budget management intervention.
- g. Multi-morbidity rates:** Research multi-morbidity rates among people receiving OST in the UK.

9.5 Strengths and limitations of the study

The current study offered a comprehensive approach to research dietary behaviours using a longitudinal convergent parallel mixed method research design. The research design of the study had a number of strengths but also limitations which are discussed in this section.

9.5.1 Strengths of the study

Building up a rapport can take time to occur between individuals. In the current study, the length of time of the field work (eighteen months) with a small group of participants allowed the researcher to spend a significant amount of time with each participant. The rapport built over five days of research with each participant translated to comprehensive qualitative insight. Interview

data explored in-depth aspects of participants' lives that may be difficult to discuss in a first meeting, particularly traumatic issues that may not have any apparent connection to food choices. In a number of cases, participants had connections from previous experiences to later lifestyle behaviours and food choices, as evident from the interview results.

Another visible strength of the study occurred *in situ* during fieldwork. The international background of the researcher prompted participants to become aware of the brands and types of foods they bought. Participants spent time to explain family traditions and cultural aspects of their food habits in the interviews. Some participants gave detailed explanations of foods and their connection to their cultural or traditional background. Some participants even separated time periods and how food preparation changed over the life course. Their awareness of flowing changes to food and traditions translated to rich descriptions of environmental factors over time and under various circumstances.

In order to maximise the data results from a smaller sample, a longitudinal convergent parallel mixed methods approach employed both quantitative and qualitative tools concurrently (Creswell, 2013). While the quantitative approach examined dietary and nutritional intakes, the qualitative results produced a method of understanding food consumption behaviour from the individual experience throughout the life course. Utilising the mixed method paradigm allowed for integration of the data and a deeper analysis that neither the quantitative approach nor the qualitative approach could achieve alone (Creswell, 2013, Castro et al., 2010, Johnson et al., 2007, Chen, 1997b). Concurrent data collection was time efficient and cost effective. Mixed methods and concurrent data collection were inherent to gather data within the scope of the PhD.

Three 24HR are adequate to represent an individual's energy intake for a normal population (Ma et al., 2009). Due to the variability of dietary and nutrient intake recorded in previous literature in people receiving OST (Best et al., 1998, Kolarzyk et al., 2005b), five 24HR were used. This extra data could capture changes in eating patterns such as meal skipping, snacking or binge eating that were prevalent in this population. The 24HR captured patterns of eating that individuals discussed in the interviews, providing comprehensive results that complemented the reasoning behind food choices and eating patterns.

In contrast to some previous studies, a comparison of nutrient intake among the sample population was carried out. This allowed differences in nutrient intake from the RNI to be characterised as typical in the general population or isolated to the current population. Significant differences between the current population and the general population were found, suggesting nutrient intake in people receiving OST could be researched further to extensively investigate the gap in knowledge.

9.5.2 Limitations of the study

The sample size was small and the data results cannot be generalised to the broader population of people receiving OST. The current study was an exploratory study to produce indicative results to identify policy gaps and further research areas. A small sample size suited the study without exhausting time and costs. A larger study is needed to further research areas identified in this study. For a significance alpha of .05, with a medium effect size ($d = 0.5$) and to achieve a power of .80, a total of 34 participants will be required.

In addition to a small sample size of the group, sample size differences of each group when separated by sex (fifteen males and ten females) may have affected the results of the study. Statistical analyses may not be accurate in their results for the group due to the small and differing sizes of the sub-groups. The small sample sizes among the groups by sex may have also introduced bias in a small sample. Though obesity rates in the current study were high for females, the same may not be true for the total female population of people receiving OST. Comparisons of the results made to the general population may provide insights, but results from the current study are not representative of people receiving OST.

The population in the study had been receiving OST for varying amounts of time. An interesting change would have been to study a population at a particular point in their prescription. As previous literature reported higher incidences of weight gain and obesity rates among people who newly began receiving OST (Stein et al., 2008), the current study could have also focused only

on people who were receiving OST for the first time. A longitudinal study could have been suited to the period during the first year of OST to track changes in weight and dietary intake.

Recruitment was time consuming and participants showed less interest in a five day study. While the allotment of five days of data collection was to minimise participant burden, participants felt it was daunting to participate in a long study. Missed appointments occurred frequently which resulted in chasing up participants and waiting long hours. During the four month interval between stages, participants moved locations, changed contact numbers, transferred to different pharmacies, found new accommodation, relapsed and disappeared from treatment or served out prison sentences. There was also considerable difficulty recruiting females to the study. There was a higher incidence of females withdrawing from the study or being dropped from the study. There were also two incidences of a partner of a participant requesting the withdrawal of said participant from the study. The projected timeline for fieldwork was approximately 12 months. However, due to recruitment problems and retention efforts, data collection was extended to 18 months.

Fieldwork was conducted at pharmacies. Small, independent pharmacies were open and welcome to researchers and recruitment for research studies. However, an established chain of pharmacies declined to cooperate at all of their region specific locations due to high customer burden. The corporate manager informed all of the pharmacy managers at each location to decline to cooperate in the research study. The pharmacy chain held locations in town centres and residential areas; the inability to recruit in those locations may have caused further delay of recruitment and data collection by recruiting in more isolated areas.

The interviewer may have introduced response bias to the study by having an international background. Participants may have displayed demand characteristics that altered their behaviour or responses during their participation in the study (Orne, 1962). While the researcher tried to review all of the supermarket brands and foods and British food traditions, there were instances when participants mentioned food and/or traditions that were not covered in known literature. International foods were particularly difficult and needed further explanation. The time spent on

the discussion of the foods may have reduced the participant's likelihood to buy the product again during the course of the study.

Furthermore, participants may have behaved differently by consuming different foods than they would eat on a regular basis during their participation in the study. In essence, there may have been social desirability bias by consuming foods that may be associated with being 'good for you' or 'healthy'. There may have also been extreme responding as a form of response bias, in that participants may have snacked more or skipped meals more often. Though five 24HR would reduce this effect, it is still a possible factor that may have occurred.

During data collection, 24HR were collected over five days. However, for several participants, five days of 24HR were dispersed over the span of weeks or a month due to missed appointments or schedule changes. Repeated administration of the 24HR occurred for most participants over non-consecutive days for a seven day period to capture habitual intake. However, the extended administration of 24HR over weeks or a month may underreport habitual intake as they were conducted on random days. Because of this, each recall was conducted in face-to-face meetings with a photographic food atlas as a visual aid to minimise underreporting of intake.

9.6 Overview of the discussion

The adapted EST model highlighted the numerous factors that can affect an individual's environment. Interpersonal factors to macro level factors can affect individuals, whether they are aware of these influences to their environments or not. It is important to address the needs of people receiving OST, but also the influencing factors that help or hinder their environments. Recommendations and policies can be developed by taking in to consideration the changes that can be made on various levels of in the EST model. Practical skills and knowledge (interpersonal system changes), larger supermarkets in socially deprived areas (exosystem changes), policies that describe the need for whole-person and patient-centred social care (macro-system changes) are only a fraction of the methods to address future policy, practice and research.

The major findings from the current study were explored further to understand and organise the environmental factors that may influence dietary behaviour through application of the EST model to meet Objectives One through Six. The application of the theoretical framework provided a deeper analysis by using the participants' lived experiences to identify the social phenomena that influenced their dietary intake, nutrient intake and body composition measures. Participants' childhoods may have influenced their dietary behaviours in adulthood. Support factors and barriers to food consumption depended on environment, accessibility of food retailers, subsidised food access, global price trends, food systems, agricultural process and governmental policies. All of these factors changed at various intervals during the life course, which altered food consumption over time. In order to meet Objective Seven, theoretical application of the EST model provided an identification method to develop policy, practice and research implications.

The strengths and limitations provided other methods to consider when researching dietary behaviours of people receiving OST. Though there were a number of necessary limitations in the study, particularly in the sample size, the strengths of the research design allowed the study to provide an in-depth mixed methods investigation within time, budget and resource constraints.

Chapter 10 Conclusion

This study set out to explore dietary and nutrition patterns of people receiving OST in the UK. It identified food consumption patterns, nutrient intake, body composition and food-related experiences from the main findings. The study also sought to investigate how dietary factors are influenced by the individual and the environment by applying a theoretical framework to analyse these factors.

There was no previous application of a theoretical framework to investigate dietary behaviours of people receiving OST. The adapted EST model in the current study identified, for each system, the environmental factors that may affect dietary behaviours of people receiving OST. People receiving OST have complicated circumstances that can potentially create barriers to food security and food sufficiency. The majority of the participants were dispersed in age from 22-53 years old, single, held no employment, lived in social housing and received state benefits. People receiving OST reported poorer self-perceived physical and mental health as compared to that of the UK general population.

Overweight and obesity were prevalent among the female participants in the current study. Risks to health may occur through obesity-related morbidity in the long-term. NSP intakes were lower than the general population among the total group in the current study. Sodium intakes were higher than the RNI, however the general population also reported higher sodium intakes. Females in the general population reported low iron intakes, but females in the current study were well below the average iron intakes of females in the general population. SAT intakes, particularly for males, exceeded the UK nutrient recommendations.

Food consumption was altered by environment during transitional phases after moving out of the home due to financial constraints or lack of food preparation knowledge. Lack of food storage facilities in accommodation also affected the ability of individuals to store foods that required refrigeration. Food acquisition and food consumption were altered during heavy drug consumption. Snacking and high energy foods were consumed. Participants also committed crimes to acquire food or rummaged through supermarkets skips to find food. Appetites were

suppressed as an effect of the drugs consumed while withdrawal effects from specific drugs resulted in binge eating.

While receiving OST, participants reported snacking, sweet and junk foods consumption. In addition to consuming full meals in a day, snacking frequency increased for several participants, particularly at the follow-up stage. Emotional issues affected appetites and participants refused to consume meals when feeling low. Participants complained of stomach and bowel issues both during heavy drug consumption periods and while receiving OST. Females expressed higher dissatisfaction with issues such as body weight, eating habits or diet. Though a partner and/or a family could help improve food consumption patterns, some participants experienced difficulty accessing large supermarkets due to long distances to reach them and no private transport. Participants bought from supermarkets' own branded or value ranges and bargain hunted for food products at various supermarkets to identify the best value.

Most participants were aware of the dietary campaign 'Five-a-day' and the message behind it. However, participants lacked nutritional knowledge and had negative experiences with dietary practitioners who left participants confused or offended. Dietary information that was provided to participants was not in an appropriate format, particularly for participants with literacy issues. Participants would be comfortable seeking dietary advice from their GPs.

People receiving OST have complex circumstances that require specialised considerations to accommodate for dietary and nutritional guidance. Financial, physical and mental health issues may complicate the situation further, preventing participants from pursuing active changes to their lifestyles. The current drug strategy agenda is not focusing on public health and social care needs for people receiving OST. Evidence from the current study shows potential risks of developing NCDs, chronic conditions and multi-morbidities that could affect the ability of people receiving OST to accrue recovery capital and reach abstinence.

Practice implications that could be developed into interventions at a later stage could include dietary lifestyle assessments to assess cooking skills and food preparation methods. Practical skills such as food preparation methods, budgeting strategies and cooking methods could

improve human and cultural capital for the individual. The provision of digestive and related health advice is another method to provide specialised care to address digestive health related issues and allow recipients to speak freely about issues that may affect well-being. Disease prevention methods must incorporate health literacy to increase the potential for people receiving OST to make informed health decisions about their dietary behaviour.

10.1 Original contribution to knowledge

There is limited research on the food consumption patterns of people receiving OST in the UK. Previous literature used diverse methods from various fields to investigate food consumption patterns and dietary behaviour. A divide existed among the previous studies. Many of the studies employed a quantitative approach to understand nutrient or dietary intake, but lacked an explanation of the social phenomena and the lived experiences of the individuals that could impact food choices. Other studies that utilised qualitative research methods informed the field of the human experiences that influenced food consumption behaviour of individuals; however it was difficult to understand the physical health status or body composition of the subjects to assess for potential risks to morbidity or NCDs.

The current study was implemented to enhance our understanding of the diet and nutrition of people receiving OST in the UK by combining quantitative and qualitative approaches. A convergent parallel mixed methods design with a longitudinal component provided a fuller spectrum of research tools that provided an in-depth analysis of a smaller sample of data to produce indicative results. A multi-component theoretical approach was essential to a deeper examination of individual factors that were content specific, but could be placed in a broader context. The EST model in the current study is a systematic approach that identified various factors to inform potential policy, practice and research implications through the organisation of nested environmental systems. The organisation of each system provided a clearer basis to understand the gaps in literature and the need for further research in specific topic areas. The EST model is highly adaptable to diverse research studies and can also be used as a policy framework guide or a framework to develop an intervention in a larger sample size.

10.2 Recommendations for future work

People receiving OST have particularly complex circumstances both due to physical health, mental health, social and financial constraints. Multiple environmental factors create difficulties in the determination of dietary and nutritional guidance for the group. The application of the adapted EST model from the current study provides a number of research topics that may be considered for future research. Further research studies could potentially explore the rates of obesity and multi-morbidities of people receiving OST in the UK. Practical research approaches such as the exploration of cooking practices and knowledge or food expenditures and household budgeting are a means to investigate the foundation of knowledge that informs an individual's decision-making process. Pinpointing a gap in skills areas may provide practical information for an intervention that can target interested individuals in improving or refining their skills.

An integrated approach to tailor insights from national dietary and public health policies to suit people receiving OST is a challenge. In *Healthy lives, healthy people: A strategy to public health in England*, the UK government stated the necessity of addressing specialised needs in particular groups:

"We have defined the ambitions in terms of excess weight, in recognition of the health risks posed by overweight as well as obesity. And, given the different levels of risk faced by different groups, it is vital that action on obesity reduces health inequalities. Particular attention needs to be given to specific socio-economic and ethnic groups and to disabled people and people with mental health needs" (HM Government, 2010b, p.14).

The government acknowledged the varying levels of risk and the particular attention that groups require in the public health strategy. People receiving OST potentially face a level of risk that may compromise their health and well-being which may be detrimental to the accrual of recovery capital. While further research is necessary, utilising an evidence base to implement a policy that targets a period when people receiving OST are most vulnerable to nutritional risks should be assessed further. By combining these two approaches and acknowledging the need for assessment, the implementation of policy recommendations would be most effective.

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Appendix A. Ethical approval for research study 11/SC/0546



Health Research Authority

NRES Committee South Central - Oxford B

Bristol REC Centre
Whitefriars
Level 3, Block B
Lewin's Mead
Bristol
BS1 2NT

Telephone: 0117 342 1333
Facsimile: 0117 342 0445

22 February 2012

Miss Suzanne Li
PhD Research Student
Oxford Brookes University
Faculty of Health and Life Sciences
Oxford Brookes University
Jack Straws' Lane
OX3 0FL

Dear Miss Li

Study title: An exploration of food and nutrition amongst drug users receiving prescribing interventions for illicit opioid dependence
REC reference: 11/SC/0546

Thank you for your letter of 30 January 2012, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS sites

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Advertisement	2	01 October 2011
Covering Letter		09 December 2011
Evidence of insurance or indemnity		08 July 2011
GP/Consultant Information Sheets	1	01 August 2011
Interview Schedules/Topic Guides	2, Stage 1	01 September 2011
Interview Schedules/Topic Guides	2, Stage 2	01 September 2011
Interview Schedules/Topic Guides	1, Dietary Recall Interview	01 September 2011
Investigator CV	Miss S li	
Letter from Sponsor		29 November 2011
Letter from Statistician	Email	14 November 2011
Letter of invitation to participant	3	01 November 2011
Other: CV for Prof Joanne Neale		
Other: CV for Dr Lisa Ryan		
Other: Anthropometric Measurement	1	01 September 2011
Other: Follow-up letter	2	01 September 2011
Other: Contact Information Sheet	2	01 November 2011
Other: Letter to Pharmacy	4	01 January 2012
Other: Offer of a Chaperone- Stage 1	1	01 January 2012
Other: Offer of a Chaperone- Stage 2	1	01 January 2012
Participant Consent Form: Stage 1	5	01 January 2012
Participant Consent Form: Stage 2	4	01 January 2012
Participant Information Sheet	5	01 January 2012
Protocol	9	01 December 2011
Questionnaire: SF-36 Health Related Quality of Life	1	01 September 2011
Questionnaire: Demographic and Drug Use	3	01 October 2011
REC application	3.1	09 December 2011
Referees or other scientific critique report		29 November 2011

Response to Request for Further Information		30 January 2012
Sample Diary/Patient Card	1	01 September 2011

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "*After ethical review – guidance for researchers*" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

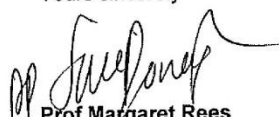
You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review

11/SC/0546	Please quote this number on all correspondence
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With the Committee's best wishes for the success of this project

Yours sincerely


Prof Margaret Rees
Chair

Email: scsha.oxfordRECB@nhs.net

Enclosures: "After ethical review – guidance for researchers" [Emailed]

Copy to: Ms Hazel Abbott
Ms Dot Powers

Appendix B. Participant consent forms

NRES Ethics Committee Number: 11/SC/0546, Version 5; January 2012		OXFORD BROOKES UNIVERSITY
CONSENT FORM – STAGE 1 CONFIDENTIAL		

Full title of Project:
An exploration of diet and nutrition amongst drug users receiving opioid substitution treatment

Name, position and contact address of researcher:
Suzanne Li, PhD Research Student
Faculty of Health and Life Sciences
Oxford Brookes University
Jack Straw's Lane
Marston Oxford OX3 0FL

Please read this form carefully. If you have any further questions, do ask. I am here to help you. You have the right to change your mind at any time, including after you have signed this form.

Please initial box

1.	I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.	<input type="checkbox"/>
2.	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.	<input type="checkbox"/>
3.	I agree to the interview being audio recorded.	<input type="checkbox"/>
4.	I understand that any information I give will be kept confidential and my real name will not be used in any work.	<input type="checkbox"/>
5.	I understand that my personal information will be destroyed immediately after the end of the study.	<input type="checkbox"/>
6.	I understand that I will be contacted in 3-4 months' time for a follow-up to the study.	<input type="checkbox"/>
7.	I agree that my drug worker or social worker may be contacted during the follow-up if I cannot be located.	<input type="checkbox"/>
8.	I agree to the use of anonymous quotations in publications.	<input type="checkbox"/>
9.	I understand that the information from the audio recorded interviews, the food and drink interviews, and the questionnaires will be stored for a minimum of 10 years at Oxford Brookes University.	<input type="checkbox"/>
10.	I understand that relevant sections of information collected during the study may be looked at by individuals from Oxford Brookes University, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	<input type="checkbox"/>

11. I agree to attend 1 session of body measurements at a private room at Oxford Brookes University or the pharmacy. ☐
12. I understand that there will be a chaperone available to me for the body measurements at Oxford Brookes University or the pharmacy. I understand that I am free to accept or reject the presence of a chaperone. ☐
13. I understand that if I am at serious risk of harming myself or others; or there are concerns for the neglect or abuse of children then the researcher will have to share my information with agencies. This may be without my permission. If this happens, this would be discussed with me first. ☐
14. I agree to take part in the above study. ☐

Name of Participant

Date

Signature

Name of Researcher

Date

Signature

1 - copy to participant

1-copy to researcher

Appendix C. Chaperone form

NRES Ethics Committee Number: 11/SC/0546, Version 1; January 2012		OXFORD BROOKES UNIVERSITY
CONFIDENTIAL		
Full title of Project: An exploration of diet and nutrition amongst drug users receiving opioid substitution treatment		
Name, position and contact address of researcher: Suzanne li, PhD Research Student Faculty of Health and Life Sciences Oxford Brookes University Jack Straw's Lane Marston Oxford OX3 0FL		
OFFER OF A CHAPERONE – STAGE 1		
Body Measurements		
		Please <u>initial</u> box
1. I confirm a chaperone was offered to me before the body measurements took place.		<input type="checkbox"/>
2. I understand I am free to accept or reject a chaperone in the room with me.		<input type="checkbox"/>
3. I (would like / would not like) a chaperone in the room with me.		<input type="checkbox"/>
_____ Name of Participant	_____ Date	_____ Signature
_____ Name of Researcher	_____ Date	_____ Signature
1 - copy to participant 1-copy to researcher		

Appendix D. Pharmacy invitation letter sample

Faculty of Health and Life Sciences
Department of Social Work and Public Health
Jack Straw's Lane
Marston Oxford OX3 0FL

Name
Address Line 1
Address Line 2
County
Postcode

Date

Dear (Insert Name Here)

Study Title: **An exploration of diet and nutrition amongst drug users receiving opioid substitution treatment**

My name is Suzanne Ii and I am a PhD student in the Faculty of Health and Life Sciences at Oxford Brookes University. I am studying the dietary behaviours, nutrient intake and food consumption patterns of drug users receiving opioid substitution treatment. I enclose the information sheet for participants which provide more, detailed information about the study.

As your pharmacy is part of the Oxfordshire Shared Care Scheme, I would like to invite you to take part in my study and to assist with the recruitment of participants. Your assistance would involve the identification of eligible participants and directing them to me for more information about the study. The eligibility requirements are: adults over the age of 18 who are receiving prescription substitution medication (i.e. methadone or buprenorphine) and have an adequate command of English.

I would like to be present at the pharmacy for approximately 3-4 weeks initially in order to provide potential participants with an information sheet about the study, answer any questions and recruit those that would like to be involved. As the study is in two stages, I would then like to follow these participants up 3-4 months later at which time I would need to be present at the pharmacy again for another 3-4 weeks. I would also like to display a recruitment poster about the study in order to advertise the study to opiate users receiving substitute medication.

In addition to this I will be taking anthropometric measurements from participants on two occasions. Although I plan to do this at Oxford Brookes University, I wonder whether I may be able to use a room on the pharmacy premises should the participant not wish to attend the University. I will try my absolute best to minimise the burden to your staff and customers.

If you have any questions about the study, or would like to discuss participation further, please contact me at 01865482669, 07930313898 or suzanne.ii-2011@brookes.ac.uk.

Thank you for your consideration. I will contact you again within the next week or so to see whether or not you would like to be involved.

With kind regards,

Suzanne Ii
PhD Researcher in Health Care
Faculty of Health and Life Sciences
Department of Social Work and Public Health
Oxford Brookes University

NRES Ethics Committee Number: 11/SC/0546, Version 4; January 2012

Appendix E. Information sheets for participants

NRES Ethics Committee Number: 11/SC/0546

Version 5; January 2012



Participant Information Sheet

Project: An exploration of diet and nutrition amongst drug users receiving opioid substitution treatment

You are invited to take part in the project: An exploration of diet and nutrition amongst drug users receiving opioid substitution treatment. It is important for you to understand why the research is being done and what it would involve. Please take time to read the following information carefully before you decide whether or not to take part.

1. What is the purpose of the study?

I am trying to understand the eating patterns, nutritional status and the physical health of drug users receiving opioid substitution medication. The main aims of the research are:

- To explore drug users' food choices, eating patterns and where they get food
- To explore drug users' nutrient intake, nutritional status and physical health

2. What would happen to me if I take part?

In Stage 1 of the study, I would arrange to meet you every day for 5 days. Each meeting would last between 30 minutes and 2 hours. I would ask you for your contact information for follow-up purposes, if I cannot reach you. If you are happy to meet again, I would contact you in 3-4 months for Stage 2. I would again meet you every day for 5 days. This would be the final stage of the study.

Stage 1: 5 day session

At a public location (e.g. café, park, etc):

1. **Days 1, 2, 3, 4 and 5:** With my help, you would be asked to remember what you ate and drank the previous day. (30 minutes for each meeting)
2. **Day 1 only:** I would ask you to complete a questionnaire involving personal information about you, your drug use and your living situation. (30 minutes)
3. **Day 2 only:** With my help, you would be asked to complete a health-related questionnaire. (30 minutes)
4. **Day 5 only:** I would ask you some more detailed questions about your life, drug use history, health, drug treatment history, your current diet, your past diet, and your thoughts and feelings about food and eating. This would be an informal interview that, with your permission, I would audio record. (60-90 minutes)

At Oxford Brookes University or the pharmacy:

1. **Day 3 OR 4 only:** You would be asked to come to Oxford Brookes University campus (or the pharmacy) for about 1 hour. I will pay for your travel to and from the university. A chaperone would also be available to you during the body measurements. I will measure your:
 - a. Height and weight
 - b. Waist and hips
 - c. Body fat on 4 parts on your body (upper and lower part of the arm, upper back and hip).

Stage 2: 3-4 month follow-up, 5 day session

For Stage 2, I would ask to meet with you after 3-4 months have passed. I would meet with you each day for 5 days.

At a public location (e.g. café, park, etc.):

1. **Days 1, 2, 3, 4 and 5:** With my help, you would be asked to remember what you ate and drank the previous day. (30 minutes for each meeting)

2. **Day 1 only:** I would ask you to complete a questionnaire involving personal information about you, your drug use and your living situation. (30 minutes)
3. **Day 2 only:** With my help, you would be asked to complete a health-related questionnaire. (30 minutes)
4. **Day 5 only:** I would ask you some more detailed questions about your life circumstances, drug use history, health and any existing health problems, drug treatment history, your current diet, your thoughts and feelings about food and eating during the previous 3-4 months. This would be an informal interview that, with your permission, I would audio record. (60-90 minutes)

At Oxford Brookes University or the pharmacy:

1. **Day 3 OR 4 only:** You would be asked to come to Oxford Brookes University campus for about 1 hour. I will pay for your travel to and from the university. A chaperone would also be available to you during the body measurements. I will measure your:
 - a. Height and weight
 - b. Waist and hips
 - c. Body fat on 4 parts on your body (upper and lower part of the arm, upper back and hip).

3. Why have I been invited to participate?

I would like to speak with men and women over the age of 18 who are receiving opioid substitution medication (i.e. methadone, Subutex). I will recruit adults from pharmacies in Oxfordshire. I aim to recruit at least 34 adults to participate in the research study described above. I would conduct in-depth interviews so each participant needs to be English-speaking.

4. Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you would be given this information sheet to keep. You would also be asked to sign a consent form. You are still free to withdraw at any time and without a given reason. Your participation would not affect your treatment or support from any service in any way.

If you are very clearly high on drugs or alcohol during your participation, I will re-schedule any meetings with you for another day.

5. What are the risks involved in the study?

There are no specific risks involved in this research.

6. What are the benefits involved in the study?

Although you will not benefit personally from taking part in the study, you will receive compensation for your time and effort for Stages 1 and 2.

Total compensation for Stages 1 and 2: £50 supermarket voucher

There would be two payment modes available for Stages 1 and 2:

End of each day: £5 supermarket voucher or End of Day 5: £25 supermarket voucher

The study would provide important information on the eating patterns and nutritional status of drug users receiving opioid substitution medication. The information would be used to understand whether there is a need for nutritional guidance and dietary advice. The results from this research would benefit future drug users in treatment.

7. Would what I say in this study be kept confidential?

All of the information you provide would be kept confidential. The information would only be available to the researcher and the supervisory team involved in this study. Your contact details would only be available to the researcher. Your contact details would be destroyed immediately after Stage 2.

Any information you tell me about your drug use history will be kept confidential. I will not ask you about any illegal activities. If you are at serious risk of harming yourself or others; or there are concerns for the neglect

or abuse of children then I will have to share your information with agencies. This may be without your permission. If this happens, I will discuss it with you first.

During the follow-up, if I cannot reach you or the contacts you have provided, I would like to contact your drug or social worker. I will explain that you are participating in the study and ask them to pass on a letter to you at your next meeting. I will not mention your drug use to your social worker. I would only mention that you are participating in a lifestyle study about diet and nutrition.

8. Where will the information be kept?

All of the information from the study would be owned by Oxford Brookes University. It will be stored at the University for a minimum of 10 years. The information would be securely stored (in password protected computers and locked cabinets) at the Faculty of Health and Life Sciences, Oxford Brookes University.

9. What would happen to the results of the study?

The results of the study would be the basis of my PhD. I will also prepare a leaflet of my findings for you that will be available from your local pharmacy sometime after January 2014.

10. Would my real name be used?

You would be given a false name and you would be assigned a number. It will not be possible to recognise you. The false name would be assigned to you for any direct quotations. Your real name would never appear in any published work and you would not be identifiable from any publications.

11. Who is organising and funding the research?

I am a PhD student at Oxford Brookes University. This research is sponsored by Oxford Brookes University and is a requirement for my program.

12. Who has ethically reviewed the project?

This project has been reviewed and approved by the Faculty Research Ethics Committee (REC), Oxford Brookes University (reference number 2011/01) and the National Research Ethics Service (NRES), South Central Oxford B.

13. Who can I contact if I have a complaint or concern about the study?

If you have any concerns about the conduct of this project, you can contact Hazel Abbott, the Chair of the Faculty Research Ethics Committee on heabbott@brookes.ac.uk or 01865 482639.

14. Who can I contact for more information about the study?

If you have any further questions about the study, please contact:

Suzanne li
PhD Research Student
Faculty of Health and Life Sciences
Oxford Brookes University
Marston Road Campus
Jack Straw's Lane
Marston Oxford OX3 0FL
Tel: 01865482669 or 07930313898
Email: suzanne.li-2011@brookes.ac.uk

If you are interested in taking part, please do not hesitate to contact me by phone, mobile or email. I am happy to meet you at the pharmacy to speak to you in person.

Thank you for taking the time to read this information sheet.

Appendix F. Demographic and drug use questionnaire

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DEMOGRAPHIC AND DRUG USE QUESTIONNAIRE

Participant ID: _____ **Stage:** _____
(COPY PARTICIPANT ID NUMBER FROM CONTACT SHEET – e.g.
001, 002, etc.)

INTERVIEWER TO ADMINISTER QUESTIONNAIRE TO
RESPONDENT

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SECTION 1 (Person data)

1.1 What is your date of birth?

Month Year

1.2 What is your sex?

Male ☐¹

Female ☐²

Other (i.e. transgender, transsexual, etc.) [specify] ☐³

1.3 What is your ethnic background? (**Always ask, never assume.**)

Asian or British Asian

Indian (A1) ☐

Pakistani (A2) ☐

Bangladeshi (A3) ☐

Any other Asian background (A9) ☐

Black or Black British

Caribbean (B1) ☐

African (B2) ☐

Any other Black background (B9) ☐

Chinese or other Ethnic Group

Chinese (O1) ☐

Any other ethnic group (O9) ☐

Mixed

White and Caribbean (M1) ☐

White and Black African (M2) ☐

White and Asian (M3) ☐

Any other mixed background (M9) ☐

White

British (W1) ☐

Irish (W2) ☐

Any other White background (W9) ☐

1.4 At what age did you leave school?

years

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1.5 What is the highest qualification you have obtained?

1.6 What has been your usual employment pattern over the last 3 years?

- | | |
|----------------------------------|---------------------------------------|
| Full-time | <input type="checkbox"/> ¹ |
| Part-time (reg hrs) | <input type="checkbox"/> ² |
| Part-time (irreg hrs) | <input type="checkbox"/> ³ |
| Student | <input type="checkbox"/> ⁴ |
| Armed forces | <input type="checkbox"/> ⁵ |
| Disability, sickness or retired | <input type="checkbox"/> ⁶ |
| Unemployed (including housewife) | <input type="checkbox"/> ⁷ |
| Prison or detention centre | <input type="checkbox"/> ⁸ |
| Other [specify] | <input type="checkbox"/> ⁹ |

1.7 Do you currently have a job? Again, I mean paid legal employment, not 'casual' or 'cash-in-hand' work.

Yes ☐¹

No ☐² → Go to question 1.10

1.8 What is your current job?

1.9 In this job, are you working full-time or part-time?

Full-time ☐¹

Part-time ☐²

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1.10 What are your current living arrangements?

- | | |
|-----------------------------|---------------------------------------|
| Own house/flat | <input type="checkbox"/> ¹ |
| Bedsit/hotel/boarding house | <input type="checkbox"/> ² |
| Hostel or shelter | <input type="checkbox"/> ³ |
| Squat | <input type="checkbox"/> ⁴ |
| House or home of friends | <input type="checkbox"/> ⁵ |
| House or home of relatives | <input type="checkbox"/> ⁶ |
| Sleeping rough | <input type="checkbox"/> ⁷ |
| Half-way house | <input type="checkbox"/> ⁸ |
| Other [specify] | <input type="checkbox"/> ⁹ |
-

1.11 Who do you currently live with?

[Show to respondent and tick all that apply]

- | | |
|-----------------|---------------------------------------|
| Partner | <input type="checkbox"/> ¹ |
| Children | <input type="checkbox"/> ² |
| Parents | <input type="checkbox"/> ³ |
| Brother/sisters | <input type="checkbox"/> ⁴ |
| Other family | <input type="checkbox"/> ⁵ |
| Friends | <input type="checkbox"/> ⁶ |
| Alone | <input type="checkbox"/> ⁷ |
| Other [specify] | <input type="checkbox"/> ⁸ |
-

1.12 Do you have any children?

Yes ☐¹

No ☐² → Go to question 1.14

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1.13 Can you tell me a bit about your children?

	i) Sex of child	ii) Age of child	iii) Is the child living with you?
a) Child 1	Male <input type="checkbox"/> Female <input type="checkbox"/>	<input type="text"/> Years <input type="text"/> Mths	No <input type="checkbox"/> Yes <input type="checkbox"/>
a) Child 2	Male <input type="checkbox"/> Female <input type="checkbox"/>	<input type="text"/> Years <input type="text"/> Mths	No <input type="checkbox"/> Yes <input type="checkbox"/>
a) Child 3	Male <input type="checkbox"/> Female <input type="checkbox"/>	<input type="text"/> Years <input type="text"/> Mths	No <input type="checkbox"/> Yes <input type="checkbox"/>
a) Child 4	Male <input type="checkbox"/> Female <input type="checkbox"/>	<input type="text"/> Years <input type="text"/> Mths	No <input type="checkbox"/> Yes <input type="checkbox"/>
a) Child 5	Male <input type="checkbox"/> Female <input type="checkbox"/>	<input type="text"/> Years <input type="text"/> Mths	No <input type="checkbox"/> Yes <input type="checkbox"/>
a) Child 6	Male <input type="checkbox"/> Female <input type="checkbox"/>	<input type="text"/> Years <input type="text"/> Mths	No <input type="checkbox"/> Yes <input type="checkbox"/>
a) Child 7	Male <input type="checkbox"/> Female <input type="checkbox"/>	<input type="text"/> Years <input type="text"/> Mths	No <input type="checkbox"/> Yes <input type="checkbox"/>
a) Child 8	Male <input type="checkbox"/> Female <input type="checkbox"/>	<input type="text"/> Years <input type="text"/> Mths	No <input type="checkbox"/> Yes <input type="checkbox"/>

1.14 Which category describes you at the moment?

Married, civil union or living with someone

☐¹

Single – in a relationship

☐²

Single – not in a relationship

☐³

→ Go to Section 2

1.15 Which of these statements best describes your partner?

Has never used illegal drugs

☐¹

Used illegal drugs but doesn't use anymore

☐²

Uses illegal drugs and trying to quit

☐³

Uses illegal drugs and is not trying to quit

☐⁴

1.16 Does your partner have a problem with drugs or alcohol?

No

☐¹

Yes, with drugs

☐²

Yes, with alcohol

☐³

Yes, with both drugs and alcohol

☐⁴

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SECTION 2 (SUBSTANCE USE)

2.1 What prescribed drugs are you currently taking as directed by the doctor or addiction specialist?

- a. Enter number of days used – enter "0" for no use;
b. Enter amount prescribed per day

SUBSTANCE	DAYS USED	AMOUNT USED ON TYPICAL DAY
1. <u>Methadone</u>		
2. <u>Methadone – Sugar Free</u>		
3. <u>Buprenorphine/Subutex</u>		
4. <u>Buprenorphine with naloxone/Suboxone</u>		
5. <u>Benzodiazepine</u>		Drug:
6. <u>Other:</u>		

Please record all prescribed drugs (including any medication that is unrelated to substance misuse, e.g. beta blockers, asthma sprays, etc).

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IMPORTANT NOTE FOR INTERVIEWER:

Re-assure interviewee that all information given in this section will remain confidential and will NOT be passed to police authorities (Note: You must keep this information confidential).

Always say: The next section is about illegal and non-prescribed drug use. Everything you say will be kept confidential. We will not tell police about your drug use. Any information you give will be kept in a way that does not link it to your personal information. It is anonymous and can only be used for research.

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2.2 What illegal or non-prescribed drugs have you taken in the last 3 days?

CARD 1											
None	1 day only	2 days only	3 days only	1 day a week	2 days a week	3 days a week	4 days a week	5 days a week	6 days a week	Every day	Some other number
0	1	2	3	4	9	13	17	21	26	30	

CARD 2			
Oral 1	Snort/sniff 2	Smoke/chase 3	Inject (IV or IM) 4

- a. Enter number of days used – enter "0" for no use;
 b. Enter amount used on a typical day, ideally in grams
 c. Record route(s) of administration [Card 2]

SUBSTANCE	DAYS USED	AMOUNT USED ON TYPICAL DAY	ROUTE(S)
1. <u>Tobacco</u>			
2. <u>Alcohol</u>			
3. <u>Heroin</u>			
4. <u>Illicit methadone</u>			
5. <u>Illicit buprenorphine/ Subutex</u>			
6. <u>Illicit Suboxone (bupre. + naloxone)</u>			
7. <u>Illicit benzodiazepine</u>		Drug:	
8. <u>Crack cocaine</u>			
9. <u>Cocaine powder</u>			
10. <u>Amphetamine</u>			
11. <u>Cannabis</u>			
12. <u>Ecstasy</u>			
13. <u>Ketamine</u>			
14. <u>Mephedrone</u>			
15. <u>Steroids</u>			
16. <u>Solvents/Inhalants</u>			
17. <u>Mushrooms</u>			
18. <u>OTC (e.g. Sudafed, Nytol, etc.)</u>			
19. <u>Other:</u>		Drug	

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2.3 What illegal or non-prescribed drugs have you taken in the last month?

CARD 1											
None	1 day only	2 days only	3 days only	1 day a week	2 days a week	3 days a week	4 days a week	5 days a week	6 days a week	Every day	Some other number
0	1	2	3	4	9	13	17	21	26	30	

CARD 2			
Oral	Snort/sniff	Smoke/chase	Inject (IV or IM)
1	2	3	4

a. Enter number of days used in 30 days – enter "0" for no use;
b. Enter amount used on a typical day in 30 days, ideally in grams
c. Record route(s) of administration

SUBSTANCE	DAYS USED	AMOUNT USED ON TYPICAL DAY	ROUTE(S)
1. <u>Tobacco</u>			
2. <u>Alcohol</u>			
3. <u>Heroin</u>			
4. <u>Illicit methadone</u>			
5. <u>Illicit buprenorphine/ Subutex</u>			
6. <u>Illicit Suboxone (bupre. + naloxone)</u>			
7. <u>Illicit benzodiazepine</u>			
8. <u>Crack cocaine</u>			
9. <u>Cocaine powder</u>			
10. <u>Amphetamine</u>			
11. <u>Cannabis</u>			
12. <u>Ecstasy</u>			
13. <u>Ketamine</u>			
14. <u>Mephedrone</u>			
15. <u>Steroids</u>		:	
16. <u>Solvents/Inhalants</u>			
17. <u>Mushrooms</u>			
18. <u>OTC (e.g. Sudafed, Nytol, etc.)</u>			
19. <u>Other:</u>		Drug:	

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2.4 What is your main drug or drugs?

2.5 Have you ever injected?

Yes ☐¹

No ☐² → Skip question 2.6

2.6 If ever injected, when did you last inject?

Month ☐ ☐ Year ☐ ☐ ☐ ☐

Appendix G. SF-36 Health related quality of life questionnaire

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SF-36 HEALTH RELATED QUALITY OF LIFE QUESTIONNAIRE

Participant ID: _____ **Stage:** _____
(COPY PARTICIPANT ID NUMBER FROM CONTACT SHEET – e.g.
001, 002, etc.)

INTERVIEWER TO ADMINISTER QUESTIONNAIRE TO
RESPONDENT

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The following questions ask you about your health, how you feel and how well you are able to do your usual activities. *[Interviewer: read out the following questions to the respondent]*

GENERAL HEALTH

1. In general, would you say your health is:

(tick one)

- Excellent..... ☐ 1
Very good..... ☐ 2
Good..... ☐ 3
Fair..... ☐ 4
Poor..... ☐ 5

2. Compared to one year ago, how would you rate your health in general now?

(tick one)

- Much better than one year ago ☐ 1
Somewhat better than one year ago..... ☐ 2
About the same ☐ 3
Somewhat worse now than one year ago.. ☐ 4
Much worse now than one year ago ☐ 5

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HEALTH AND DAILY ACTIVITIES

The following questions are about activities that you might do during a typical day. Does **your health now limit you** in these activities? If so, how much? *[Interviewer: read out activities and circle one number on each line]*

ACTIVITIES	Yes, limited a lot	Yes, limited a little	No, not limited at all
3) Vigorous activities , such as running, lifting heavy objects, participating in strenuous sports	1	2	3
4) Moderate activities , such as moving a table or pushing a vacuum cleaner	1	2	3
5) Lifting or carrying groceries	1	2	3
6) Climbing several flights of stairs	1	2	3
7) Climbing one flight of stairs	1	2	3
8) Bending, kneeling or stooping	1	2	3
9) Walking more than a mile	1	2	3
10) Walking half a mile	1	2	3
11) Walking 100 yards	1	2	3
12) Bathing or dressing yourself	1	2	3

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During the **past 4 weeks**, have you had any of the following problems with your regular daily activities **as a result of your physical health**? *[Interviewer: read out list and circle one number on each line.]*

	YES	NO
13) Cut down on the amount of time you spent on activities	1	2
14) Accomplished less than you would like	1	2
15) Were limited in the kind of activities	1	2
16) Had difficulty in performing activities (e.g. it took extra effort)	1	2

During the **past 4 weeks**, have you had any of the following problems with regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)? *[Interviewer: read out list and circle one number on each line]*

	YES	NO
17) Cut down on the amount of time you spent on activities	1	2
18) Accomplished less than you would like	1	2
19) Didn't do activities as carefully as usual	1	2

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20. During the **past 4 weeks**, to what extent have your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours or groups? *[show card 20]*

(tick one)

- Not at all ☐ 1
Slightly..... ☐ 2
Moderately ☐ 3
Quite a bit..... ☐ 4
Extremely ☐ 5

21. How much **bodily** pain have you had during the **past 4 weeks**? *[show card 21]*

(tick one)

- None..... ☐ 1
Very mild ☐ 2
Mild..... ☐ 3
Moderate ☐ 4
Severe..... ☐ 5
Very severe ☐ 6

22. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including work both outside the home and housework)? *[show card 22]*

(tick one)

- Not at all ☐ 1
A little bit..... ☐ 2
Moderately ☐ 3
Quite a bit..... ☐ 4
Extremely ☐ 5

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FEELINGS

These questions are about how you feel and how things have been with you during **the past 4 weeks**. (For each question, please indicate the one answer that comes closest to the way you have been feeling.) *[Interviewer: read out options and circle one number on each line]*

How much of the time during the past 4 weeks:	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
23) Did you feel full of life?	1	2	3	4	5	6
24) Have you been a very nervous person?	1	2	3	4	5	6
25) Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
26) Have you felt calm and peaceful?	1	2	3	4	5	6
27) Did you have a lot of energy?	1	2	3	4	5	6
28) Have you felt down-hearted and low?	1	2	3	4	5	6
29) Did you feel worn-out?	1	2	3	4	5	6
30) Have you been a happy person?	1	2	3	4	5	6
31) Did you feel tired?	1	2	3	4	5	6

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32. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)? *[show card 32]*

(tick one)

- All of the time ☐ 1
Most of the time..... ☐ 2
Some of the time ☐ 3
A little of the time..... ☐ 4
None of the time..... ☐ 5

HEALTH IN GENERAL

Please choose the answer that best describes how **true** or **false** each of the following statements is for you. *[Interviewer: read out options and circle one number on each line]*


	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
33) I seem to get ill more easily than other people	1	2	3	4	5
34) I am as healthy as anybody I know	1	2	3	4	5
35) I expect my health to get worse	1	2	3	4	5
36) My health is excellent	1	2	3	4	5

Appendix H. Dietary record sheet

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[illegible]

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Dietary Intake Record Sheet - Recipe								
Participant ID: _____			Day: _____ OF 5			Stage: _____		
Date: _____			Sex: _____			Age: _____		
RECIPE			RECIPE			RECIPE		
Name of Dish: _____			Name of Dish: _____			Name of Dish: _____		
INGREDIENTS:			INGREDIENTS:			INGREDIENTS:		
Name	Brand	Amount	Name	Brand	Amount	Name	Brand	Amount
Cooking Method:			Cooking Method:			Cooking Method:		

Appendix I. Anthropometric measurement worksheet

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Anthropometric Measurements			
<div style="display: flex; justify-content: space-between;"> <div> Date: _____ Participant ID: _____ Height: _____ cm Weight: _____ kg Waist Circumference: _____ cm Hip Circumference: _____ cm Waist to Hip Ratio: _____ </div> <div> Stage: _____ Age: _____ Sex: _____ BMI: _____ </div> </div>			
Skinfold Measurements:			
Trial 1	Trial 2	Trial 3	Mean
Bicep: _____	_____	_____	_____
Tricep: _____	_____	_____	_____
Subscapular: _____	_____	_____	_____
Suprailiac: _____	_____	_____	_____
*Discrepancy between 2-4%			
Other Notes:			

Appendix J. Interview Schedule for Stage 1

NRES Ethics Committee Number: 11/SC/0546

Version 7; March 2012



AN EXPLORATION OF DIET AND NUTRITION AMONGST DRUG USERS RECEIVING OPIOID SUBSTITUTION TREATMENT

INTERVIEW SCHEDULE FOR STAGE 1

Introduction

- Call/text location and time to contact point at the university
- Greet the participant
- Assure confidentiality
- Turn mobiles off
- Thank interviewee for participating for the past four days
- Ask for permission to audio record

Background

I'd like to start by asking you a few questions about your background.

- Can you tell me how old you are?
- How would you describe your ethnic background?
- Can you tell me about your educational background?
 - *Probe: what age left school*

Employment

- Are you currently employed? If so,
 - What do you do?
 - Full-time?
 - Part-time?
 - What are your hours like?
- If unemployed
 - Do you have a source of income at the moment? If so, what?
 - Are you receiving benefits? How much?
 - Note to self: if participant asks, this is because income is likely to influence food choices and diet

Housing/Living Arrangements

- Where do you live? Own/rent/share/council/hostel/homeless
 - Who owns the property?
 - Who live with? Alone/family/friends/shared
 - Partner and/or children? Live together/come to visit/shared parental arrangement/custody arrangement
 - Ever lived in a hostel?

Social Network

- Do you have close family/friends?
 - How many family/friends would you say you are close to?
 - Live nearby?
 - Visit them or visit you?
 - How often?

General Health

- How is your health?
 - Physical Health - Receiving any medications?
 - Mental Health - Receiving any medications?

- Attending therapy? Seeing psychiatrist/CBT/group therapy/other
 - *Prompts: eating disorders, therapy for eating disorders*

Drug-related information

- Can you tell me about your previous/current drug use?
 - *Prompts: what, where, how much, who with, RoA (injecting/smoking/ingesting/snorting/other)*
 - Have you been tested for blood-borne viruses? If you do not mind telling me, what were the results of the tests?
- Can you tell me about your alcohol consumption?
 - *Prompts: what, how much, how often, who with*
 - How would you describe your drinking?
 - *Prompts: water, fruit juice, soft drinks, alcoholic drinks, Mixers, replacing food with alcohol*
 - *Probe: hot drinks - tea, coffee, adding milk/cream/sugar/sweeteners, heavier drinking, lighter drinking*
- Can you tell me about your tobacco use?
 - *Prompts: what, how much, how often, who with*
- Drug treatment/self-help experiences
 - What kinds of treatment have you received for your drug use?
 - *Prompts: Community/residential detox or rehab, support groups such as NA, AA, etc.*
- Have you been to prison? How long? How many times?
 - All the same prison? Different prisons?
 - *If yes, probe later for eating patterns in prison*

Eating history

- Role and place of food in childhood (including when, where, with whom food was eaten, who prepared food, food likes and dislikes)
 - Thinking back to your childhood, where/with whom were you living?
 - Was someone cooking for you?
 - How would you describe your eating growing up?
 - *Prompts: three square meals (hot/cold), snacks and snacking, types of food (homemade, pre-packaged, frozen, tinned, etc.), portion size, appetite*
 - Were you a picky eater or were you happy to eat everything on your plate?
 - How would you describe your drinking growing up?
 - *Prompts: soft drinks, water, juices, alcohol*
 - *Prompts: first time drinking alcohol – with who, how much, how regularly*
 - Were you eating with other people? How would you describe eating with him/her/them?
 - *Prompts: feelings of support, closeness, difficulties with others, environment of eating together or separately*
- Role and place of food after leaving home/first independent living (including when, where, with whom food was eaten, how food was obtained, who prepared food, food likes and dislikes)
 - Thinking back to when you first lived away from home/lived independently, were you living with anyone? If so, who?
 - Where did you buy/obtain your food?
 - Who cooked/did you do any cooking?
 - *Prompts: cooking with/for someone, cooking alone/with someone*
 - How would you describe your eating?
 - *Prompts: three square meals (hot/cold), snacks, types of food (homemade, pre-packaged, frozen, tinned, etc.), portion size, appetite*
 - Sharing food/eating meals with someone or alone

- How would you describe your drinking?
 - *Prompts: types of drinks, alcohol, how much, how regularly*
 - Drinking with others or alone
- Role and place of food in the period between leaving home/first independent living and the present (including when, where, with whom food was eaten, how food was obtained, who prepared food, food likes and dislikes)
 - Thinking back to when you left home and up to the present, were you living with anyone? If so, who?
 - Where did you buy/obtain your food?
 - How would you describe cooking?
 - *Prompts: cooking with/for someone, cooking alone/with someone*
 - How would you describe your eating?
 - *Prompts: three square meals (hot/cold), snacks, types of food (homemade, pre-packaged, frozen, tinned, etc.), portion size, appetite*
 - Sharing food/eating meals with someone or alone
 - How would you describe your drinking?
 - *Prompts: types of drinks, alcohol, how much, how regularly*
 - Drinking with others or alone

Drug/alcohol use, physical health, food/drink consumption

Thinking back to when you started using drugs...

- Impact of drug/alcohol/tobacco use on eating (including when, where, with whom food is eaten, who prepares food, how food is accessed, food likes and dislikes)
 - Where did you get your food?
 - *Prompts: if sleeping at a friend's house or sleeping rough, how did you get your food? Anyone give you food? Go anywhere to get food, like a shelter or soup kitchen?*
 - What about cooking?
 - *Prompts: cooking with/for someone/alone*
 - How would you describe your eating?
 - *Prompts: three square meals (hot/cold), snacks, types of food (homemade, pre-packaged, frozen, tinned, etc.), portion size*
 - Sharing food/eating meals with someone or alone
 - How would you describe your appetite?
 - *Prompts: type of appetite - smaller portions, eat small amounts frequently, large portions, eat large portions regularly, eat infrequently, eat only when needed, eat the same foods numerous times, pick at food*
 - How would you describe your drinking?
 - *Prompts: types of drinks, alcohol and non-alcohol, how much, how regularly*
 - Drinking with others/alone
 - How would you describe your smoking?
 - *Prompts: how much, how regularly*
- Impact of drug/alcohol/tobacco use on physical/digestive health
 - While using drugs, can you tell me a bit about your general everyday physical health?
 - *Prompts: physical appearance – hair/skin/teeth, physical energy, sleeping patterns, physical condition*
 - Do you think drug/alcohol/tobacco use affected your eating? If so, how?
 - *Prompts: loss of appetite, lost interest in eating, weight loss/gain, cravings*
 - Digestion
 - Do you think drug/alcohol/tobacco use affected your digestion? If so, how?
 - When you first started using drugs, how did you feel after eating?
 - *Prompts: stomach pains, indigestion, feelings of guilt, vomiting, worry about weight gain, worry about losing weight or dieting*

- Going to the toilet
- How often did you poo?
- Were there times when you experienced periods of diarrhoea or constipation?
 - *Prompts: heavier use, lighter use, detoxing, frequency, consistency, if 'normal' – what does that mean?*
- If problems, what did you do to alleviate them?
 - *Prompts: feeling bloated, changes to eating patterns/physical energy*
- If normal, what does that mean?

Current daily eating and drinking patterns

Thinking about your current situation...

- Can you tell me a bit about what you do in a typical day?
 - Sleep patterns, physical activities, physical energy levels
 - *Prompts: shopping, work, housework, errands, college, education, any children to help dress/care for/see off to school?*
- When do you eat? Plan eating? Eat when you feel like it?
 - *Prompts: cravings, binge eating, avoiding food, replacing drugs with food*
- What do you eat?
 - *Prompts: types of food – meat, vegetables, fruits, carbs/starches, dairy, sweets, etc.*
 - *Probe: problems eating due to dental problems, chewing, diarrhoea, constipation, depression, other health-related limitations on eating*
- Are there any foods you enjoy eating?
 - Do you have any favourite foods?
 - *Prompts: eating experience, eating sweets, food cravings*
- Any foods that you dislike?
 - Are there any foods that you avoid eating/dislike?
 - Are you a picky eater or are you able to eat most foods?
 - Are you intolerant or allergic to any foods?
- Do you eat food that is cooked?
 - *Prompts: oven roasted, grilled, pan-fried, deep-fried, stewed, boiled, steamed, raw etc.*
 - When you eat, are they meals or more snacks?
 - *Prompts: Hot/cold meals, home cooked food, fast food, three meals a day, snack foods*
- How would you describe your appetite?
 - *Prompts: type of appetite - smaller portions, eat small amounts frequently, large portions, eat large portions regularly, eat infrequently, eat only when needed, eat the same foods numerous times, pick at food*
- Where do you get your food?
 - *Prompts: shopping experience, how frequently, what types of food*
 - *Prompts: Family, friends, bins, shelters, soup kitchens, supermarket skips*
- Do you have a place to cook food?
 - What type of facility? Continuous access? Share facilities?
 - *Prompts: food cooking experience, how frequently, what kinds of food cooked*
 - Are you able to cook? If so,
 - *Prompts: who taught you, how did you become interested*
 - If you are unable to cook:
 - *Probe: barriers to food and eating, how do you feel about being unable to cook?*
 - *Prompts: would you like to learn, are you interested*
 - How would you describe cooking food?

- *Prompts: pleasurable experience, inconvenient or time consuming, a necessity, stressful*
- Do you cook with/for someone? Does someone cook for you?
- How would you describe cooking with/for someone/cooking alone?
- Positive factors
 - *Prompts: eagerness to cook, willingness to cook, support from someone*
- Negative factors
 - *Prompts: Feeling nagged to cook, find cooking a chore, too much effort*
- Do you eat with friends or family?
 - *Prompts: source of support, stability, eat meals regularly*
- Are you happy with how you are currently eating?

Treatment, physical health, food/drink consumption

- **SUBSTITUTE MEDICATION**
- Impact of any substitute drugs on physical health, eating patterns, food consumption and digestive health
 - Can you tell me a bit about your physical health after you started opioid substitute medication?
 - *Prompts: physical appearance – hair/skin/teeth, physical energy, sleeping patterns, physical condition, other medications*
 - Can you tell me more about what foods you ate?
 - *Prompts: cravings, binge eating, avoiding foods*
 - Do you think the substitute medication affected your eating? If so, how?
 - *Prompts: loss of appetite, lost interest in eating, weight loss/gain, cravings*
 - How would you describe your eating?
 - *Prompts: three square meals (hot/cold), snacks, types of food (homemade, pre-packaged, frozen, tinned, etc.), portion size, appetite*
 - Sharing food/eating meals with someone
 - How would you describe your drinking?
 - *Prompts: types of drinks, alcohol, how much, how regularly, is it a problem for you*
 - Drinking with others/drinking alone
 - Digestion
 - How did you feel after eating?
 - *Prompts: fine, good, stomach pains, indigestion, feelings of guilt, vomiting, worry about weight gain, worry about losing weight or dieting*
 - Going to the toilet
 - How often did you poo?
 - Constipation? Diarrhoea? If so, what did you do to alleviate it?
 - *Prompts: feeling bloated, changes to eating patterns/physical energy*
- **RESIDENTIAL TREATMENT**
- Impact of any residential treatments on physical health, eating patterns, food consumption and digestive health
 - Have you attended residential treatment? If so, were you going through detox, rehabilitation or both?
 - After you started residential treatment, can you tell me a bit about your physical health?
 - *Prompts: physical appearance – hair/skin/teeth, physical energy, sleeping patterns, physical ailments, medications*
 - Who cooked the meals?
 - Can you tell me more about what foods you ate?
 - Were you able to choose what you ate? Was there a choice of menu?
 - *Prompts: cravings, binge eating, avoiding foods*
 - Were you obliged to eat at specific times? How did you feel about it?
 - Were you obliged to finish all of the food? How did you feel about it?
 - How would you describe your eating in residential treatment?

- *Prompts: three square meals (hot/cold), snacks, types of food (homemade, pre-packaged, frozen, tinned, etc.), portion size, appetite*
 - Sharing food/eating meals with someone
- What did you drink?
 - *Prompts: types of drinks, alcohol, how much, how regularly*
 - Drinking with others
- Digestion
 - How did you feel after eating?
 - *Prompts: stomach pains, indigestion, feelings of guilt, vomiting, worry about weight gain, worry about losing weight or dieting*
- Going to the toilet
 - How often did you poo?
 - Constipation? Diarrhoea? If so, what did you do to alleviate it?
 - *Prompts: feeling bloated, changes to eating patterns/physical energy*
- **IMPRISONMENT**
- Impact of any periods of imprisonment on physical health, eating patterns, food consumption and digestive health
 - You mentioned you were in prison/were you in prison? If so,
 - While you were in prison, can you tell me a bit about your physical health?
 - *Prompts: physical appearance – hair/skin/teeth, physical energy, sleeping patterns, physical ailments, medications*
 - Can you tell me more about what type of foods were served?
 - *Prompts: who cooked, obligation to eat, obligation to finish food*
 - How would you describe your eating?
 - *Prompts: cravings, binge eating, avoiding foods*
 - *Prompts: three square meals (hot/cold), snacks, types of food (homemade, pre-packaged, frozen, tinned, etc.), portion size, appetite*
 - Digestion
 - How did you feel after eating?
 - *Prompts: fine, good, stomach pains, indigestion, feelings of guilt, vomiting, worry about weight gain, worry about losing weight or dieting*
 - What did you do to alleviate any eating/stomach problems?
 - Going to the toilet
 - How often did you poo?
 - Constipation? Diarrhoea? If so, what did you do to alleviate them?
 - *Prompts: feeling bloated, changes to eating patterns/physical energy*

Other factors influencing food choices and eating patterns

- Potential barriers:
 - Financial situation
 - Do you budget for food? If so, how do you budget?
 - *Prompts: frequency, how does it make you feel*
 - Are there times when you have no money for food? What do you do? How do you feel about it?
 - *Prompts: going to eat at someone's house, eating food from bins, stealing food, receive food from a service, soup kitchen/shelter*
 - Time constraints
 - Are there times when you are busy and put off eating?
 - *Prompts: frequency, how does it make you feel*
 - If you are hungry and have no time to/cannot eat, what do you do to alleviate the hunger?
 - Local food outlets
 - Are there shops that sell food close to your home? What sorts of shops?
 - *Prompts: how close/expensive, small/large, supermarkets, corner shops, take away food restaurants, do you use them, why/why not*
 - How do you find the variety of food that you can buy locally?

- *Prompts: difficulty finding certain foods, too expensive, have certain brands and not others*
 - What do you do if you cannot find the product you are looking for?
- Potential enablers:
 - Support
 - Does anyone give you food or invite you to meals?
 - *Prompts: who, what kind of food, when, how much, how often*
 - Is there someone you can talk to about food and eating?
 - *Prompts: cooks food for you/encourages you to eat/advises you about eating*
 - Is there someone you can talk to about food worries or eating worries?
 - *Prompts: worries about hunger/worries about food availability/get advice about food or hunger-related problems/stresses*
 - Has anyone ever shown you how to cook?
 - *Prompts: helping out parents/watching others cook/learning new recipes*
- Food knowledge
 - What does 5 a day mean to you?
 - What does a healthy/balanced diet mean to you?
 - How many calories are you getting in a day?
 - How do you feel about eating lots of fruits and vegetables?
 - *Prompts: wholemeal foods, organic foods, fairtrade foods*
- Factors which might improve eating patterns and food choices:
 - Has anyone from a service ever spoken to you about diet, nutrition or cooking?
 - Is there anything (such as a service or guidance available) to help improve your eating?
 - Would you like guidance or help to improve your eating?
 - *Prompts: cooking courses, gardening, nutritional counselling, other advice*

Ending

- Anything else participant would like to add
THANK PARTICIPANT FOR THEIR TIME AND TURN RECORDER OFF.

Appendix K. Interview schedule for Stage 2

NRES Ethics Committee Number: 11/SC/0546

Version 5; August 2012



AN EXPLORATION OF DIET AND NUTRITION AMONGST DRUG USERS RECEIVING OPIOID SUBSTITUTION TREATMENT

INTERVIEW SCHEDULE FOR STAGE 2

Introduction

- Prepared for the interview by listening to the Stage 1 interview or reading the transcript
- Call/text location and time to contact point at the university
- Greet the participant
- Assure confidentiality
- Turn mobiles off
- Thank interviewee for participating for the past four days
- Ask for permission to audio record

Background

It's been about 4 months since I last saw you in (MONTH)...

How have you been?

Employment

- Can you tell me a bit about employment over the last four months?
 - What were you doing?
 - Full-time?
 - Part-time?
 - What were/are your hours like?
- If unemployed
 - Were you receiving income over the last four months? If so, what?
 - Are you receiving benefits? How much?
 - Note to self: if participant asks, this is because income is likely to influence food choices and diet
 - Were you receiving benefits the entire four months?

Housing/Living Arrangements

- Can you tell me about your housing situation over the last 4 months?
 - Who owns the property?
 - Who live with? Alone/family/friends/shared
 - Partner and/or children? Live together/come to visit/shared parental arrangement/custody arrangement

General Health

- How was your health over the last 4 months?
 - Physical Health - Receiving any new medications?
 - Mental Health - Receiving any new medications?
 - Attending therapy since 4 months ago? Started or stopped attending therapy?
 - Seeing psychiatrist/CBT/group therapy/other
 - Prompts: eating disorders, therapy for eating disorders

Drug-related information

- Can you tell me about your drug use since I saw you four months ago?

- *Prompts: what, where, how much, who with, RoA (injecting/smoking/ingesting/snorting/other)*
- Can you tell me about your alcohol consumption?
 - *Prompts: what, how much, how often, who with*
 - How would you describe your drinking?
 - *Prompts: water, fruit juice, soft drinks, alcoholic drinks, Mixers, replacing alcohol with food*
- Can you tell me about your tobacco use?
 - *Prompts: what, how much, how often, who with*
- Drug treatment/self-help experiences
 - Since I saw you last, have you had any drug-treatment or therapy?
 - *Prompts: Community/residential detox or rehab, support groups such as NA, AA, etc.*
- Have you been to prison in the last four months? How long? How many times?
 - All the same prison? Different prisons?
 - *If yes, probe later for eating patterns in prison*

Current daily eating and drinking patterns

Thinking about the last four months...

- Can you tell me a bit about what you currently do on a typical day?
 - Sleep patterns, physical activities, physical energy levels
 - *Probe: Any differences in activities since 4 months ago*
 - *Prompts: shopping, work, housework, errands, college, education, any children to help dress/care for/see off to school?*
- Can you tell me a bit about your eating since I last saw you?
 - *Prompts: cravings, binge eating, avoiding food, replacing drugs with food*
 - *Probe: problems eating due to dental problems, chewing, diarrhoea, constipation, depression, other health-related limitations on eating*
 - Are you a picky eater or are you able to eat most foods?
 - Are you intolerant or allergic to any foods?
- Can you tell me a bit about drinking non-alcoholic drinks over the last four months?
 - *Prompts: drinking coffee/tea, fizzy drinks, juices, squash*
 - How do you take your coffee/tea? Milk/sugar/sweeteners?
 - *Probe: sweet tea, sweet coffee, drinking more/drinking less*
- When you eat, are they meals or more snacks?
 - *Prompts: Hot/cold meals, home cooked food, fast food, three meals a day, snack foods*
- How would you describe your appetite over the last 4 months?
 - *Prompts: type of appetite - smaller portions, eat small amounts frequently, large portions, eat large portions regularly, eat infrequently, eat only when needed, eat the same foods numerous times, pick at food*
- Where were you getting your food over the last 4 months?
 - *Prompts: shopping experience, how frequently, what types of food*
 - *Prompts: Family, friends, bins, shelters, soup kitchens, supermarket skips, how often*
- Do you have a place to cook food?
 - What type of facility? Continuous access? Share facilities?
 - *Prompts: food cooking experience, how frequently, what kinds of food cooked*
 - Are you able to cook? If so,
 - *Prompts: who taught you, how did you become interested*
 - If you are unable to cook:
 - *Probe: barriers to food and eating*
 - *Prompts: would you like to learn, are you interested*

- How would you describe cooking food?
 - *Prompts: pleasurable experience, inconvenient or time consuming, a necessity, stressful*
- Do you cook with/for someone? Does someone cook for you?
- How would you describe cooking with/for someone/cooking alone?
- Positive factors
 - *Prompts: eagerness to cook, willingness to cook, support from someone*
- Negative factors
 - *Prompts: Feeling nagged to cook, find cooking a chore, too much effort*
- Do you eat with friends or family?
 - *Prompts: source of support, stability, eat meals regularly*
- Are you happy with how you are currently eating?
- How would you describe your drinking the last four months?
 - *Prompts: types of drinks, alcohol, how much, how regularly, is it a problem for you*
 - *Drinking with others/drinking alone*
- Digestion
 - How has your digestion been the last four months?
 - *Prompts: fine, good, stomach pains, indigestion, feelings of guilt, vomiting, worry about weight gain, worry about losing weight or dieting*
 - *Probe: Anything about digestion that is different, changed or out of the ordinary*
 - If not on substitute medication anymore, how is your digestion?
 - *Probe: Anything about digestion that is different, changed or out of the ordinary*
- Going to the toilet
 - How have your bowel movements been the last four months?
 - Constipation? Diarrhoea? If so, what did you do to alleviate it?
 - *Prompts: feeling bloated, changes to eating patterns/physical energy*
 - If not on substitute medication anymore, how is going to the toilet?
 - *Probe: Anything about going to the toilet that is different, changed or out of the ordinary*

Treatment, physical health, food/drink consumption

- **SUBSTITUTE MEDICATION**
- Impact of any substitute drugs on physical health, eating patterns, food consumption and digestive health
 - Can you tell me a bit about your physical health while you have been on opioid substitute medication the last four months?
 - *Prompts: physical appearance – hair/skin/teeth, physical energy, sleeping patterns, physical condition, other medications*
 - Were you reducing over the last 4 months?
 - *Prompts: completely off of OST/switched from methadone to buprenorphine or vice versa/come off OST and now back on*
 - Have you switched from methadone to another substitute? If so,
 - Can you tell me more about the experience?
 - *Probe for eating and digestion while on the new substitute*
 - *Prompts: Differences between the two medications with regards to eating and digestion*
 - Do you think the substitute medication affected your eating? If so, how?
 - *Prompts: loss of appetite, lost interest in eating, weight loss/gain, cravings*
- **RESIDENTIAL TREATMENT**
- Impact of any residential treatments on physical health, eating patterns, food consumption and digestive health
 - Have you attended residential treatment since our last interview? If so, were you going through detox, rehabilitation or both?

- After you started residential treatment, can you tell me a bit about your physical health?
 - *Prompts: physical appearance – hair/skin/teeth, physical energy, sleeping patterns, physical ailments, medications*
- Who cooked the meals?
- Can you tell me more about what foods you ate?
- Were you able to choose what you ate? Was there a choice of menu?
 - *Prompts: cravings, binge eating, avoiding foods*
- Were you obliged to eat at specific times? How did you feel about it?
- Were you obliged to finish all of the food? How did you feel about it?
- How would you describe your eating in residential treatment?
 - *Probe: three square meals (hot/cold), snacks, types of food (homemade, pre-packaged, frozen, tinned, etc.), portion size, appetite*
 - *Sharing food/eating meals with someone*
- What did you drink?
 - *Prompts: types of drinks, alcohol, how much, how regularly*
 - *Drinking with others*
- Digestion
 - How did you feel after eating?
 - *Prompts: stomach pains, indigestion, feelings of guilt, vomiting, worry about weight gain, worry about losing weight or dieting*
- Going to the toilet
 - How often did you poo?
 - Constipation? Diarrhoea? If so, what did you do to alleviate it?
 - *Prompts: feeling bloated, changes to eating patterns/physical energy*
- **IMPRISONMENT**
- Impact of any periods of imprisonment on physical health, eating patterns, food consumption and digestive health
 - You mentioned you were in prison/were you in prison during the last four months? If so,
 - While you were in prison, can you tell me a bit about your physical health?
 - *Prompts: physical appearance – hair/skin/teeth, physical energy, sleeping patterns, physical ailments, medications*
 - Can you tell me more about what type of foods were served?
 - *Prompts: who cooked, obligation to eat, obligation to finish food*
 - How would you describe your eating?
 - *Prompts: cravings, binge eating, avoiding foods*
 - *Probe: three square meals (hot/cold), snacks, types of food (homemade, pre-packaged, frozen, tinned, etc.), portion size, appetite*
 - Digestion
 - How did you feel after eating?
 - *Prompts: fine, good, stomach pains, indigestion, feelings of guilt, vomiting, worry about weight gain, worry about losing weight or dieting*
 - What did you do to alleviate any eating/stomach problems?
 - Going to the toilet
 - How often did you poo?
 - Constipation? Diarrhoea? If so, what did you do to alleviate them?
 - *Prompts: feeling bloated, changes to eating patterns/physical energy*

Other factors influencing food choices and eating patterns

Thinking about the last four months...

- Potential barriers:
 - Financial situation
 - Were there times when you budgeted for food since I saw you last? If so, how did you budget?
 - *Prompts: frequency, how does it make you feel*
 - Were there times when you had no money for food? What did you do? How did you feel about it?
 - *Prompts: going to eat at someone's house, eating food from bins, stealing food, receive food from a service, soup kitchen/shelter*
 - Time constraints
 - Were there times when you were busy and put off eating, in the last 4 months?
 - *Prompts: frequency, how does it make you feel*
 - If you were hungry and had no time to/could not eat, what did you do to alleviate the hunger?
 - Local food outlets
 - Are there shops that sell food close to your home? What sorts of shops?
 - *Probe: ask if they have moved and ask about food access near the home*
 - *Prompts: how close/expensive, small/large, supermarkets, corner shops, take away food restaurants, do you use them, why/why not*
 - How do you find the variety of food that you can buy locally?
 - *Prompts: difficulty finding certain foods, too expensive, have certain brands and not others*
 - Mental health
 - Were there times when you didn't feel like eating or had no appetite due to emotional problems?
 - *Prompts: how often, difficulty finding the effort to cook or eat, skipping meals*
 - Were there times when you ate more due to emotional problems?
 - *Prompts: how often, cravings, eating due to feeling sad/anxious/nervous/stressed*
- Potential enablers:
 - Support
 - Has anyone given you food or invited you to meals the last four months?
 - *Prompts: who, what kind of food, when, how much, how often*
 - Is there someone you can talk to about food and eating?
 - *Prompts: cooks food for you/encourages you to eat/advises you about eating*
 - Is there someone you can talk to about food worries or eating worries?
 - *Prompts: worries about hunger/worries about food availability/get advice about food or hunger-related problems/stresses*
 - Has anyone ever shown you how to cook?
 - *Prompts: helping out parents/watching others cook/learning new recipes*
- Factors which might improve eating patterns and food choices:
 - Has anyone from a service spoken to you about diet, nutrition or cooking in the last four months?
 - Would you like guidance or help to improve your eating?
 - *Prompts: cooking courses, gardening, nutritional counselling, other advice*

Hopes and plans for the future

- Vision of the future:
 - Can you tell me a little bit about your plans in the near future?
 - *Prompts: food and eating, activities, hopes, achievements, goals*
 - How do you feel about it?

Ending

- Anything else participant would like to add
THANK PARTICIPANT FOR THEIR TIME AND TURN RECORDER OFF.